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# An Aquatic Resource Survey of Devon, Cornwallis, Somerset and Northern Baffin Islands, District of Franklin, Northwest Territories, 1980

Northern Affairs Program

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G. MacDonald March 1981

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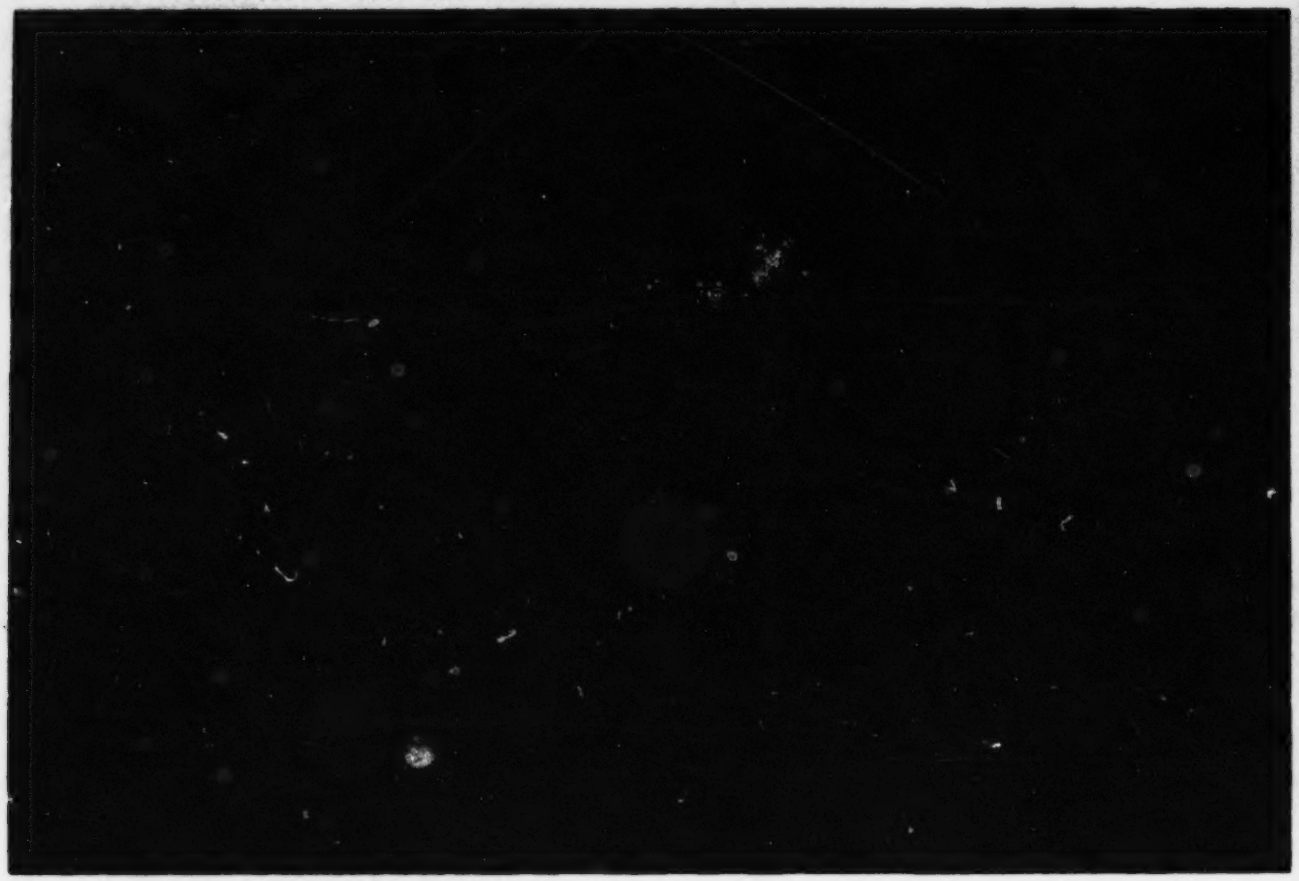
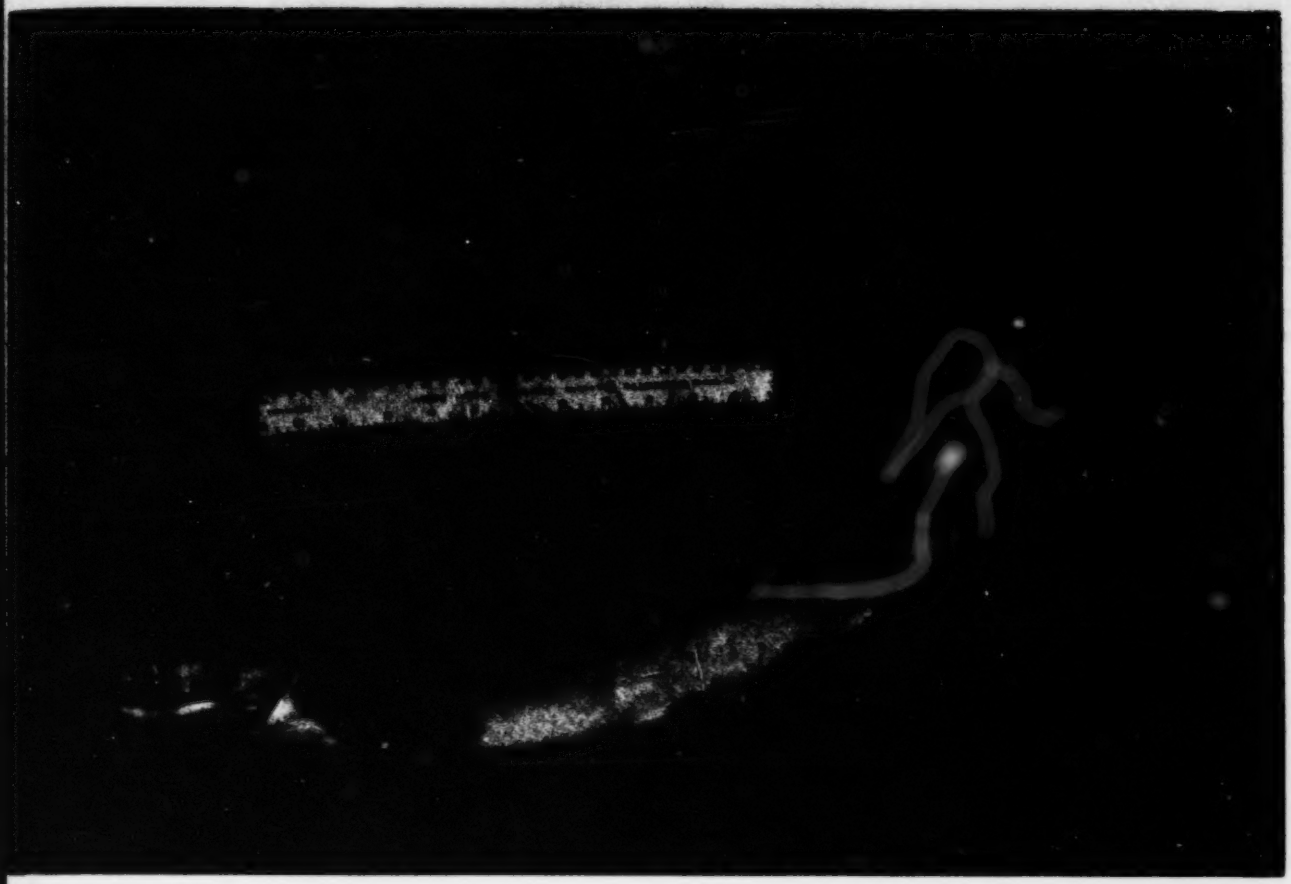


Large anadromous male Arctic charr (Salvelinus alpinus) in spawning colours from a lake at the head of Thomas Lee Inlet, Devon Island. Note the lack of vegetation.



Large female Arctic charr in spawning colours from Fish Lake, Devon Island. Note the vegetation surrounding this lake on the Truelove Lowland.

# INTRODUCTION

This report documents the results of survey work conducted in the summer of 1980 for the Northern Land Use Information mapping program. This fisheries survey encompasses Devon, Cornwallis, Somerset and northern Baffin island in the District of Franklin, Northwest Territories, (Fig.1). These islands border Lancaster Sound which is an area of interest for potential resource and transportation development.

The Land Use Information Series is an environmental research and information mapping program for northern Canada, which provides a convenient reconnaissance-level information base to facilitate regional planning and application of the Territorial Land Use Regulations. This report provides a detailed description of the fisheries information in the study area, and the main observations and results are portrayed on the individual Land Use Information Series maps.

During the survey, data were collected on freshwater fish, zooplankton, water chemistry, and domestic and commercial fisheries. This report summarizes the data collected and briefly discusses freshwater and marine fish research in the area. The work was funded jointly by the Department of Indian Affairs and Northern Development, and the Lands Directorate of the Department of the Environment.

A list of other reports related to the Land Use Information Series is provided in Appendix IV.

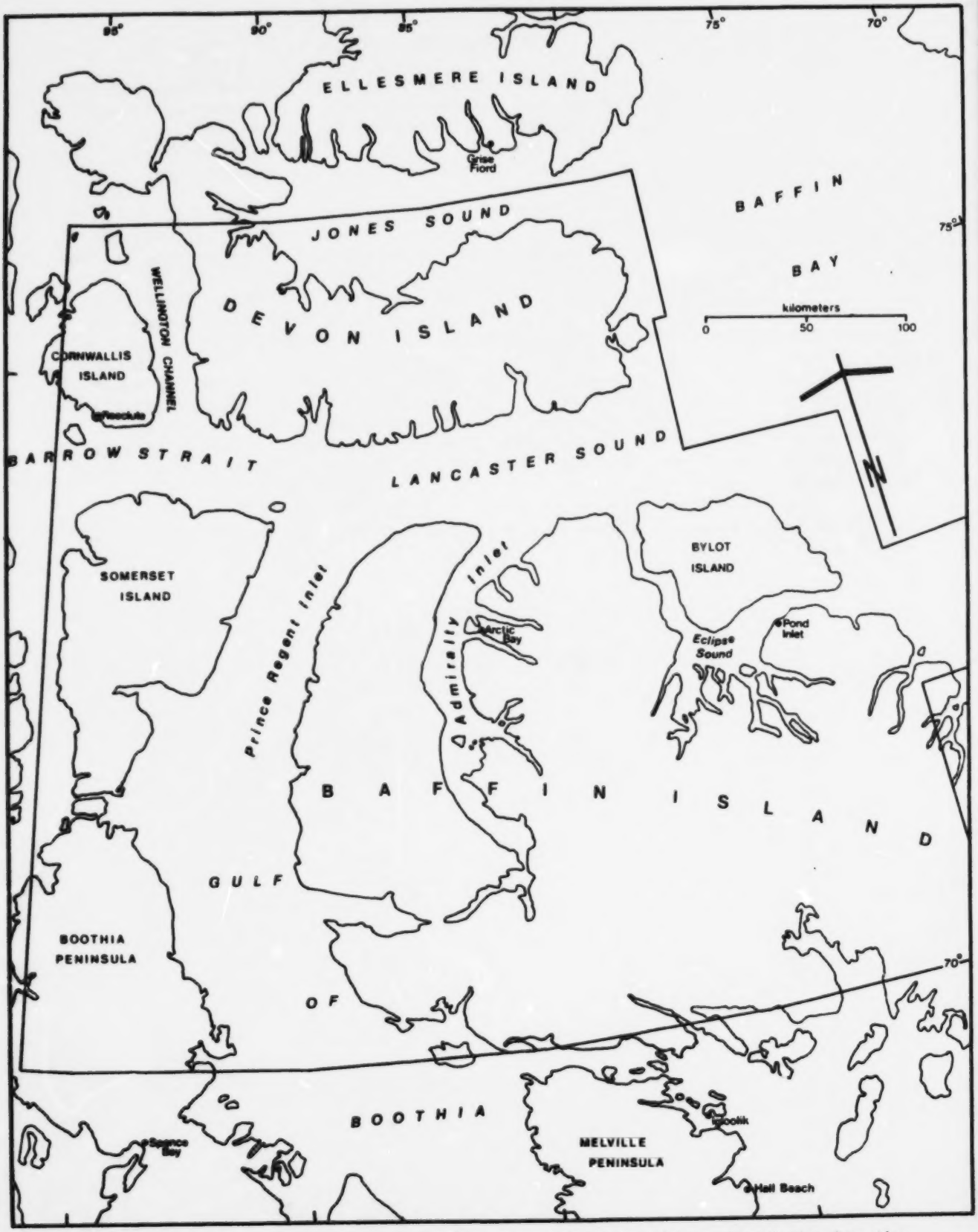



Figure 1. Map of the Canadian Arctic Islands bordering Lancaster Sound showing the study area boundaries.

## MATERIALS AND METHODS

The data presented in this report were compiled from a recent reconnaissance survey, previous studies, and comments of local residents. Experimental sampling was conducted during July and August 1980, using a float equipped Bell 206B Jet Ranger helicopter. Samples of fish, zooplankton and water were taken.

Fish were collected using Swedish nylon multifilament gillnets, 1.8 m deep and either 60 or 120 m long. Nets consisted of six equal panels of either 10, 12, 16, 19, 22, and 25 mm mesh (bar measure) or 10, 19, 33, 45, 55 and 60 mm mesh. These nets have shown the capacity to catch the widest range of fish sizes likely to be encountered in northern freshwater (Johnson in prep). Fry were captured using 61 cm diameter hoopnets, with 3.7 m wings, constructed of #35 delta nylon with meshes 3.2 mm square.

Fish were weighed (round weight 0-30 g ± 0.5 g; 30-2000 g ± 10 g; 2000-4000 g ± 50 g) and measured for fork length (0-20 mm ± 0.25 mm; > 20 mm ± 0.5 mm) in the field immediately after capture. Otoliths were removed and stored in coin envelopes for subsequent age determination in the laboratory following the technique of Grainger (1953). Pectoral fins, of some larger fish, were removed and stored in coin envelopes until bones in the fins could be analyzed for strontium content. A subsample of fish stomachs was preserved in formalin and analysed in the laboratory. Invertebrates in the diet were identified to family and fish to species. The incidence of gut parasitism by *Diphyllobothrium sp.* was also noted. Gonads were examined and degree of maturity was assigned according to the following scale:

| Male | Female | Development |
|---|---|---|
| 1 | 7 | immature |
| 2 | 8 | mature |
| 3 | 9 | near ripe |
| 4 | 10 | ripe |
| 5 | 11 | ripe & running |
| 6 | 12 | spent |
| 0 | | sex indistinguishable |

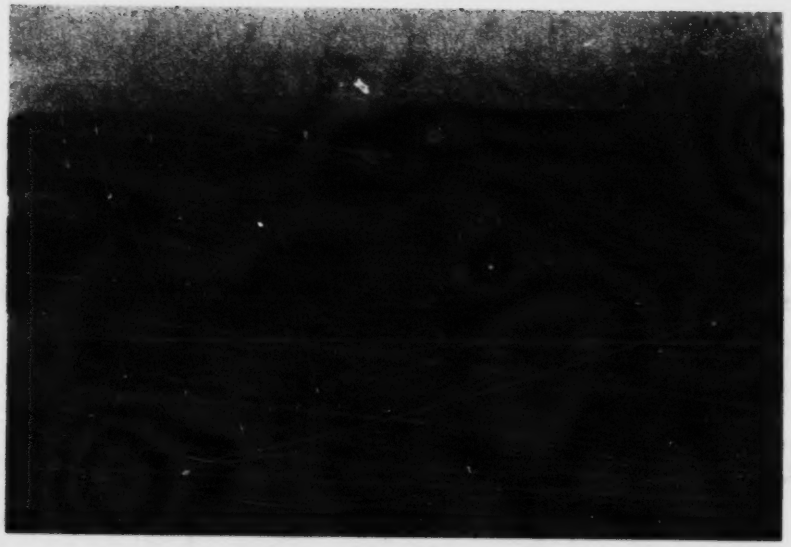
Representative fish specimens were preserved and shipped to the National Museum of Natural Sciences in Ottawa (See Appendix II).

Zooplankton were collected in single vertical hauls using a 73 micron mesh Wisconsin net with a 25 cm mouth diameter. Specimens were preserved in >10% formalin and all identifications and measurements were made by Dr. and Mrs. K. Patalas. The specimens are available from Dr. Patalas at the Freshwater Institute in Winnipeg.

Water samples were collected in litre nalgene bottles held below the surface beside the helicopter float. Dissolved organic carbon; particulate carbon, nitrogen and phosphorus; calcium, magnesium, potassium, sodium, chloride, and sulphate; and chlorophyll A samples were handled and stored as per Stainton et al. (1977). Stainton's sample storage methods were not followed for dissolved nitrogen and phosphorus or for specific conductance. The nitrogen and phosphorus samples were filtered but did not undergo UV combustion; specific conductance was measured on stored samples. These deviations in technique should not have seriously altered measurements, because the samples were chemically dilute (Stainton pers.comm.). Laboratory pH measurements included in the results may differ from actual lake values because of storage effects. Poor lake buffering prevented pH measurements using litmus paper test kits, as chemicals in the paper altered the pH of water being tested by as many as three pH units. Strontium excepted, all chemical analyses were performed by the Analytical Unit at the Freshwater Institute. Secchi depth (Welch 1942), secchi color, and water depth and temperature were measured in the field.

Pectoral fin bone samples were analysed in an effort to determine whether charr were anadromous (Moreau and Barbeau 1979, Behrens Yamada et al. 1979, Gaboury 1980). The fins were prepared for analysis by soaking in boiling water for about half an hour, stripping the rays of all flesh and connective tissue, rinsing in distilled water, and drying at 85°C overnight. Once clean and dry, 30-50 mg of bone was digested in graduated test tubes using 3.0 ml of nitric acid and 0.5 ml of perchloric acid. The nitric acid and some of the perchlorate were boiled off during digestion. The remaining perchloric acid solution was adjusted to 25 ml, and analysed by Direct Current Plasma Emission (DCP) at 407.7 nm, using aqueous standards. Water samples from lakes supporting the fish tested were analysed directly using DCP at 407.7 nm. Both analyses were performed by Bob Hunt of the Fish and Ecosystem Toxicology Section of the Freshwater Institute.

Tiny seasonal streams have eroded deep channels into the sedimentary plateaus of Devon Island is shown.



Polar desert lake at the head of Thomas Lee Inlet, Devon Island. Note the accessible outlet to the sea which allows anadromous charr to migrate between lake and sea.

# RESULTS

## 1. DEVON ISLAND

*General Description:*

The Devon Island coasts rise abruptly from the sea to a plateau, between 400 and 500 m above sea level, extending from coast to coast. The plateau surface is unmetamorphosed sedimentary rock, underlain by the crystalline complex of the Canadian Shield (Christie 1968, Krupicka 1977). The eastern end of the plateau is covered by glacial ice which rises nearly 2,000 m above sea level (Fig. 2). Seasonal streams, flowing from the glaciers and plateau, have cut deep valleys into the plateau and drop precipitously to the sea. There are few lakes on Devon Island and they are generally situated near the coast. Ice cover on streams and lakes develops in September and lasts until June or July, although some deeper lakes may remain ice covered year-round (Rydén 1977). Climatic conditions are harsher on the plateau, which is a polar desert, than on the isolated coastal lowlands (Courtin and Labine 1977). Mosses and herbs of the polar desert are concentrated in the shallow troughs of polygons and between or under frost shattered rock fragments (Muc and Bliss 1977). Sedges, mosses, heaths, and heathers dominate the lowland plant communities.

There is a wealth of information available on the geology, glaciology, hydrology, and biology of northeastern Devon Island. This information results from many years of study by scientists from the Arctic Institute of North America (AINA), 1959-80 (Apollonio 1962, Barr et al. 1967, Barr et al. 1968, Barrett et al. 1969), and from a whole ecosystem study conducted by the Canadian committee for the International Biological Program (IBP), 1970-74 (Bliss 1971, 1977).

*Domestic, Commercial, and Sport Fishing:*

There are no permanent settlements on Devon Island but Inuit from Grise Fiord, on Ellesmere Island (Fig. 1), occasionally cross Jones Sound to fish for Arctic charr, *Salvelinus alpinus* (Riewe 1976, 1977; Pattie pers. comm.). Charr were a staple food for Grise Fiord Inuit before 1953 when they moved north from Pond Inlet and Port Harrison, Quebec. They are prized for their delicious flesh but because there are few charr-supporting lakes near Grise Fiord, residents must travel long distances to fish. Fishing expeditions to Devon Island are normally made between April and June, when daylight is sufficient and sea ice is still strong enough to permit travel on Jones Sound.

Charr are caught through the lake ice using either a jig and spear or short gillnets. Several lakes along the north coast of Devon Island (Fig. 2; locations 7, 10, 16, and 22) are fished for large, probably anadromous, Arctic charr. Smaller landlocked charr are caught in five other lakes along the north coast (Fig. 2; loc. 6, 11, 15, 19 and 23). On occasion, Grise Fiord Inuit have even travelled to Eleanor Lake on Cornwallis Island (Fig. 4) to catch large anadromous charr (Freeman 1976). Only 125 kg of domestically

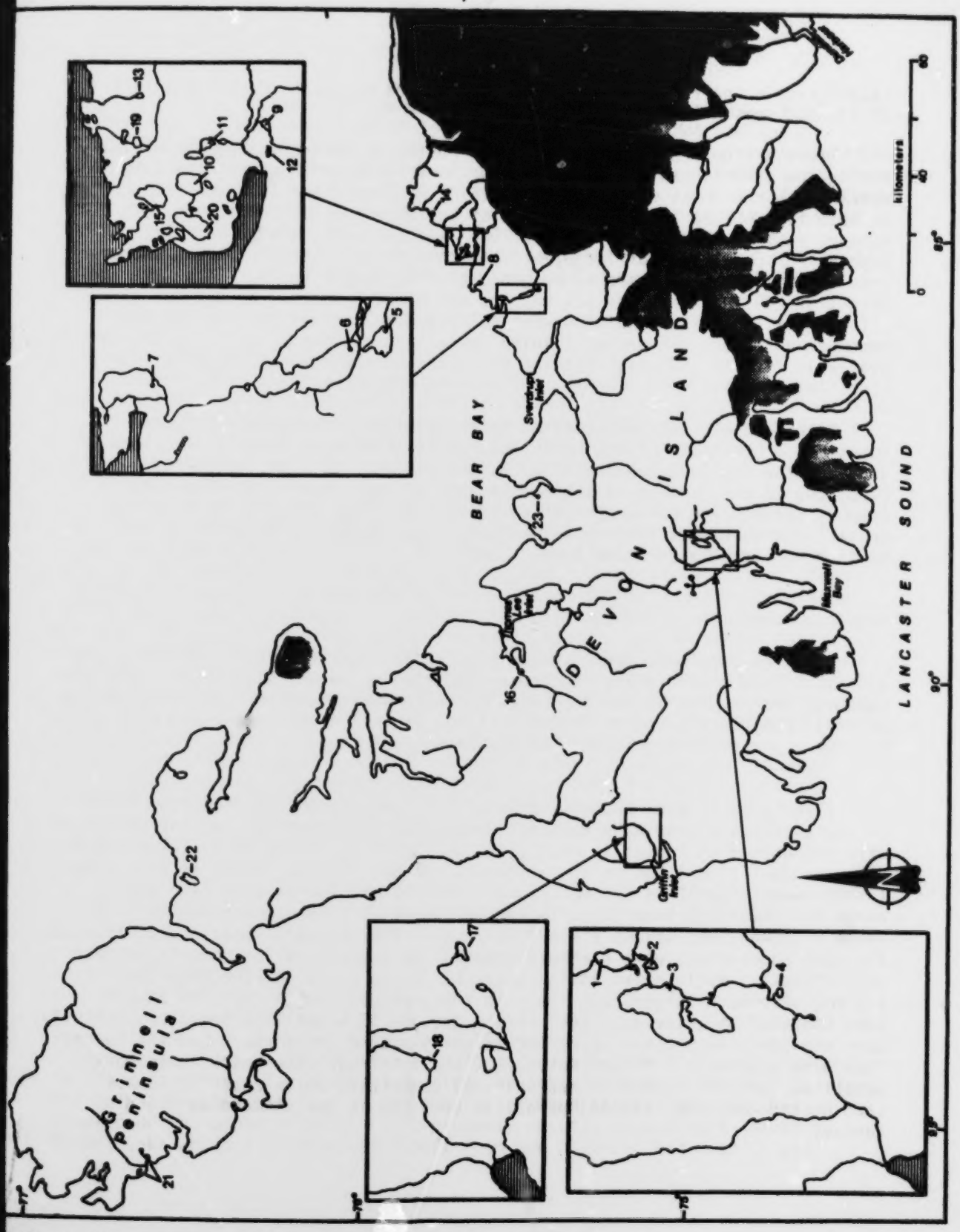



Figure 2. Locations on Devon Island, N.W.T. sampled during the 1980 fish survey (1-18) or investigated during previous research (7, 10, 15, 16, 19-23).

caught Arctic charr were reported by Grise Fiord residents during the 1978-79 fishing season (Kristofferson pers. comm.).

There are no records of Grise Fiord residents having fished commercially during the 1978-79 season (Kristofferson pers. comm.). However, two lakes along the north coast of Devon Island (Fig. 2, loc. 7 and 16) have been tested, to determine whether they are capable of sustained yields sufficient to support a small commercial fishery. One lake (loc. 7), tested in 1977, supports a population of large, old anadromous charr (Kristofferson unpubl. data). Growth rate appears to be good, as fish caught (n=78) had an average weight of 2491 g, length of 624 mm, and age of 20.3 years. No data on catch effort, sex, and fish condition were collected so further testing has been recommended before commercial fishing quotas are assigned. Data are not yet available for the 1980 test fishing of a lake at the head of Thomas Lee Inlet (loc. 16).

Poor accessability has limited sport fishing on Devon Island to two locations. Residents of the AINA research station angle charr from several lakes on the Truelove Lowland (Fig. 2, loc. 10 and 15). Phalarope Lake (loc. 20) on the Lowland is avoided because of poor fishing (Pattie pers. comm.). Pilots and passengers of aircraft travelling between Resolute and Grise Fiord sometimes stop at a lake adjoining Thomas Lee Inlet (loc. 16) to fish for large anadromous Arctic charr.

*Previous Research:*

Prior to 1980 only four limited studies of fish resources, including the aforementioned test fishery, had been conducted on Devon Island. In 1962, the Canadian Arctic Unit of the Fisheries Research Board, sampled two lakes on the Grinnell Peninsula (Fig. 2, loc. 21). They caught only Arctic charr and specimens are preserved in the National Museum of Canada's collection (McAllister pers. comm.).

Also in 1962, C.W. Nichol (unpubl. data) collected fish from four lakes in the vicinity of the AINA research station on Truelove Lowland. Arctic charr were the only fish caught in Fish (Fig. 2, loc. 10), Immerk (loc. 15) and two other unidentified lakes on the lowlands. On the average, charr in Fish Lake (n=92) were longer ($\bar{x}$ = 422 mm, range = 267-670 mm) and heavier ($\bar{x}$ = 621 g, range = 120-3635 g) than those in Immerk Lake (n=64; length $\bar{x}$ = 345 mm, range = 147-487 mm; weight $\bar{x}$ = 429 g, range = 250-1125 g). Length distributions for both populations were strongly bimodal but there were far more large fish in Fish Lake. While charr in the greatest length class in Fish Lake (650-670 mm) were much larger than those in the greatest length class in Immerk Lake (450-487 mm), the mean ages of the groups, 18.5 and 17.3 years respectively, were similar. Both lakes supported sexually mature dwarf charr and the largest fish were cannibals. Nichol noted that charr in Fish Lake hosted both mouth parasites (80-90% incidence) and internal parasites, while charr in Immerk Lake hosted only the internal parasites encysted in the stomach wall and caecae.

Loon, (Fig. 2, loc. 19) Immerk, (loc. 15) and Fish Lakes (loc. 10) on the Truelove Lowland were sampled by Minns (1977) between May and August 1973. The charr populations of each lake had strongly bimodal length distributions and similar length-weight relationships. Minns did not catch large charr in Fish Lake and concluded that all of the Lowland populations were landlocked. Adult and pupal chironomids were the main food of charr during the period of insect emergence between late June and late August. Before emergence, stomachs of fish from Immerk Lake contained some *Mysis relicta* and chironomid larvae while charr in Fish Lake consumed cyclopodids and chironomid larvae.

*Survey Results:*

Fourteen of the Devon Island lakes sampled (n=18) contained Arctic charr, the only fish species captured. Large and small lakes situated on the plateau, coastal lowlands lakes surrounded by vegetation or polar desert, and elevated coastal lakes isolated from both plateau and lowland by steep cliffs, all contained charr.

Three interconnected lakes, high on the plateau at the head of Maxwell Bay (Fig. 2, loc. 1-3), support thriving landlocked charr populations. The headwater lake (loc. 1) drains via a small lake (loc. 2) into the largest lake in the system (loc. 3) and then to the sea. Connections between lakes are passable to fish but waterfalls in the stream connecting the large lake to the sea prevent upstream fish migrations. The system is situated on barren tundra and the lakes were still nearly ice covered in early August. Fish in this lake system live longer and grow larger but at a slower rate than charr in Nelson Lake on Cornwallis Island (Fig. 3A, 5A). The youngest mature fish caught were 13 and 16 years of age for males and females respectively. The presence of ripe and ripe and running fish indicates that spawning occurs during August. Few of the mature fish were in or near spawning condition suggesting that individual charr do not spawn annually. During early August, chironomid larvae and pupae were the main food items although trichopteran pupae, hydracarina, plant material and other charr were also eaten. There were parasites, *Diphyllobothrium sp.*, encysted in the gut walls of several fish (Tables 1-3).

Three small isolated lakes (Fig. 2; loc. 4, 17, 18) on the plateau contained populations of slow growing or dwarf charr. Each of the lakes was situated on polar desert, all were ice free by early August, and fish could not enter the lakes from the sea or from nearby lakes. Two species of crustacean zooplankton, *Cyclops vicinus* and *Daphnia longiremis*, were present in the smallest of the lakes (loc. 4, Table 3). This is the first report of *Cyclops vicinus* occurring in a Canadian lake. Neither crustacean zooplankton nor rotifers were abundant in the lake. Chlorophyll A in the lake was low but concentrations of the other nutrients and dissolved solids were similar to those in other polar desert lakes (eg. Nelson, Table 8; Table 4). Calcium and sulphate concentrations in the lake water were higher than in lakes sampled on the other islands. This probably results from stream erosion. Bechel Lake which also receives runoff from the plateau, had high Ca and

Table 1. Summary of age, length, and weight data for Devon Island Arctic charr.

| Sampling Location | | | Length (mm) | | Weight (g) | | Condition Factor | | Length-Weight Relationship** | | | | Age (y) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site # | Coordinates | N | Mean (Range) | S.D. | Mean (Range) | S.D. | Mean | S.D. | y intercept (log a) | slope (b) | S.D. of b | $r^2$ | n | Mean (Range) | S.D. |
| 1 | 75°02'N, 88°12'W | 18 | 465 (293-576) | 75 | 1040 (200-2020) | 522 | 0.963 | 0.084 | -6.280 | 3.469 | 0.057 | 0.996 | 17 | 21.9 (18-31) | 4.8 |
| 2 | 75°01'N, 88°12'W | 6 | 303 (105-548) | 184 | 460 (7.5-1510) | 590 | 0.806 | 0.107 | -5.254 | 3.066 | 0.091 | 0.996 | 6 | 14.0 ( 7-20) | 5.9 |
| 3 | 75°05'N, 88°15'W | 30 | 352 (110-530) | 73 | 427 (10.5-1510) | 254 | 0.878 | 0.153 | -5.060 | 3.000 | 0.103 | 0.968 | 29 | 22.0 ( 7-29) | 5.4 |
| 4 | 74°57.5'N, 88°15'W | 16 | 101 (91-112) | 5 | 8.5 (7-14) | 1.7 | 0.817 | 0.125 | -3.303 | 2.108 | 0.764 | 0.352 | 16 | 8.7 ( 7-11) | 1.4 |
| 5 | 75°25.5'N, 88°09'W | 15 | 325 (115-585) | 156 | 532 (16-1920) | 605 | 0.939 | 0.177 | -4.798 | 2.904 | 0.084 | 0.989 | 12 | 17.5 ( 5-26) | 6.9 |
| 7 | 75°34'N, 85°13'W | 9 | 212 (103-368) | 113 | 156 (8.5-460) | 177 | 0.877 | 0.115 | -5.339 | 3.122 | 0.097 | 0.993 | 9 | 10.2 ( 5-23) | 6.1 |
| 8 | 75°38'N, 85°01'W | 14 | 135 (103-365) | 71 | 43 (8.5-400) | 104 | 0.829 | 0.045 | -5.043 | 2.981 | 0.044 | 0.997 | 11 | 7.4 ( 5-17) | 3.7 |
| 9h† | 75°37.5'N, 84°25'W | 7 | 130 (52-175) | 43 | 27 (2-40) | 17 | 1.042 | 0.183 | -4.288 | 2.665 | 0.084 | 0.995 | 5 | 10.2 ( 3-17) | 5.8 |
| 10 | 75°39.5'N, 84°33'W | 12 | 398 (201-622) | 122 | 850 (70-3100) | 829 | 0.988 | 0.137 | -5.747 | 3.286 | 0.085 | 0.993 | 12 | 20.5 ( 6-31) | 7.6 |
| 11h† | 75°39'N, 84°28'W | 42 | 111 (62-194) | 36 | 17 (2-65) | 16 | 0.950 | 0.092 | -4.876 | 2.927 | 0.046 | 0.990 | 21 | 4.2 ( 1-10) | 2.5 |
| 11 | 75°39'N, 84°28'W | 18 | 398 (98-536) | 101 | 621 (8.5-1080) | 286 | 0.876 | 0.121 | -4.831 | 2.911 | 0.087 | 0.986 | 16 | 20.5 ( 3-27) | 6.1 |
| 15h† | 75°41'N, 84°33'W | 16 | 79 (36-111) | 19 | 4.3 (0.3-10.5) | 2.8 | 0.773 | 0.084 | -5.194 | 3.042 | 0.109 | 0.982 | 8 | 2.3 ( 1-3) | 0.7 |
| 16 | 75°33'N, 89°53'W | 17 | 367 (110-705) | 168 | 775 (12-3800) | 975 | 0.886 | 0.124 | -5.410 | 3.141 | 0.048 | 0.996 | 17 | 16.1 ( 3-24) | 7.7 |
| 17 | 75°10'N, 91°42'W | 31 | 126 (100-297) | 40 | | | | | | | | | 30 | 8.3 ( 6-18) | 2.4 |
| 18 | 75°11'N, 91°54'W | 13 | 410 (115-505) | 106 | 671 (12-1250) | 370 | 0.817 | 0.107 | -5.296 | 3.079 | 0.102 | 0.988 | 13 | 27.1 ( 8-38) | 8.1 |

*Condition Factor = Weight in g·(fork length in mm)$^{-3}$·$10^5$ **log weight in g = b·log length in mm + log a † h = hoopnet

Table 2. Summary of sexual maturity data for Devon Island Arctic charr

| Site # | Date | N | Sex | Maturity | | | | | | | Age of Youngest mature fish (y) | Length of Youngest mature fish (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Immature | Mature | Near Ripe | Ripe | Ripe & Running | Spent | Unknown | | |
| 1 | 31/7-3/8/80 | 9 | male | 1 | 7 | | | 1 | | | 17 | 460 |
| | | 8 | female | | 5 | 2 | 1 | | | | 19 | 293 |
| | | 18 | total | 1 | 12 | 2 | 1 | 1 | | 1 | | |
| 2 | 31/7-3/8/80 | 3 | male | | 3 | | | | | | 13 | 249 |
| | | 1 | female | 1 | | | | | | | | |
| | | 6 | total | 1 | 3 | | | | | 2 | | |
| 3 | 31/7-3/8/80 | 19 | male | 2 | 14 | 1 | 2 | | | | 16 | 403 |
| | | 10 | female | | 8 | | 2 | | | | 20 | 351 |
| | | 30 | total | 2 | 22 | 1 | 4 | | | 1 | | |
| 4 | 31/7-3/8/80 | 5 | male | | | 2 | 3 | | | | 8 | 96 |
| | | 10 | female | 1 | 6 | 4 | | | | | 7 | 96 |
| | | 16 | total | 1 | 6 | 6 | 3 | | | | | |
| 5 | 5-6/8/80 | 5 | male | | 3 | 2 | | | | | 15 | 370 |
| | | 8 | female | 2 | 6 | | | | | | 14 | 280 |
| | | 15 | total | 2 | 9 | 2 | | | | 2 | | |
| 7 | 5-6/8/80 | 2 | male | 2 | | | | | | | 11 | 150 |
| | | 5 | female | 2 | 1 | 1 | 1 | | | | | |
| | | 9 | total | 4 | 1 | 1 | 1 | | | 2 | | |
| 8 | 5-6/8/80 | 3 | male | 3 | | | | | | | | |
| | | 4 | female | 4 | | | | | | | | |
| | | 14 | total | 7 | | | | | | 7 | | |
| 9 | 5-6/8/80 | 3 | male | 3 | | | | | | | 15 | 158 |
| | | 2 | female | | 1 | 1 | | | | | | |
| | | 7 | total | 3 | 1 | 1 | | | | 2 | | |
| 10 | 6-7/8/80 | 4 | male | | 1 | 3 | | | | | 21 | 400 |
| | | 8 | female | 2 | 2 | 3 | | 1 | | | 11 | 257 |
| | | 12 | total | 2 | 3 | 6 | | 1 | | | | |
| 11 | 6-7/8/80 | 14 | male | 3 | 8 | 3 | | | | | 7 | 152 |
| | | 16 | female | 8 | 6 | 1 | 1 | | | | 18 | 382 |
| | | 40 | total | 11 | 14 | 4 | 1 | | | 10 | | |
| 15 | 7-8/8/80 | | male | | | | | | | | | |
| | | | female | | | | | | | | | |
| | | 13 | total | | | | | | | 13 | | |
| 16 | 8-9/8/80 | 11 | male | 1 | 8 | 1 | 1 | | | | 7 | 210 |
| | | 6 | female | 2 | 4 | | | | | | 17 | 407 |
| | | 18 | total | 3 | 12 | 1 | 1 | | | 1 | | |
| 17 | 8-9/8/80 | 1 | male | | 1 | | | | | | 14 | 241 |
| | | 1 | female | | 1 | | | | | | 18 | 297 |
| | | 2 | total | | 2 | | | | | | | |
| 18 | 8-9/8/80 | 8 | male | 1 | 3 | 3 | 1 | | | | 22 | 440 |
| | | 5 | female | 1 | 3 | 1 | | | | | 24 | 392 |
| | | 13 | total | 2 | 6 | 4 | 1 | | | | | |

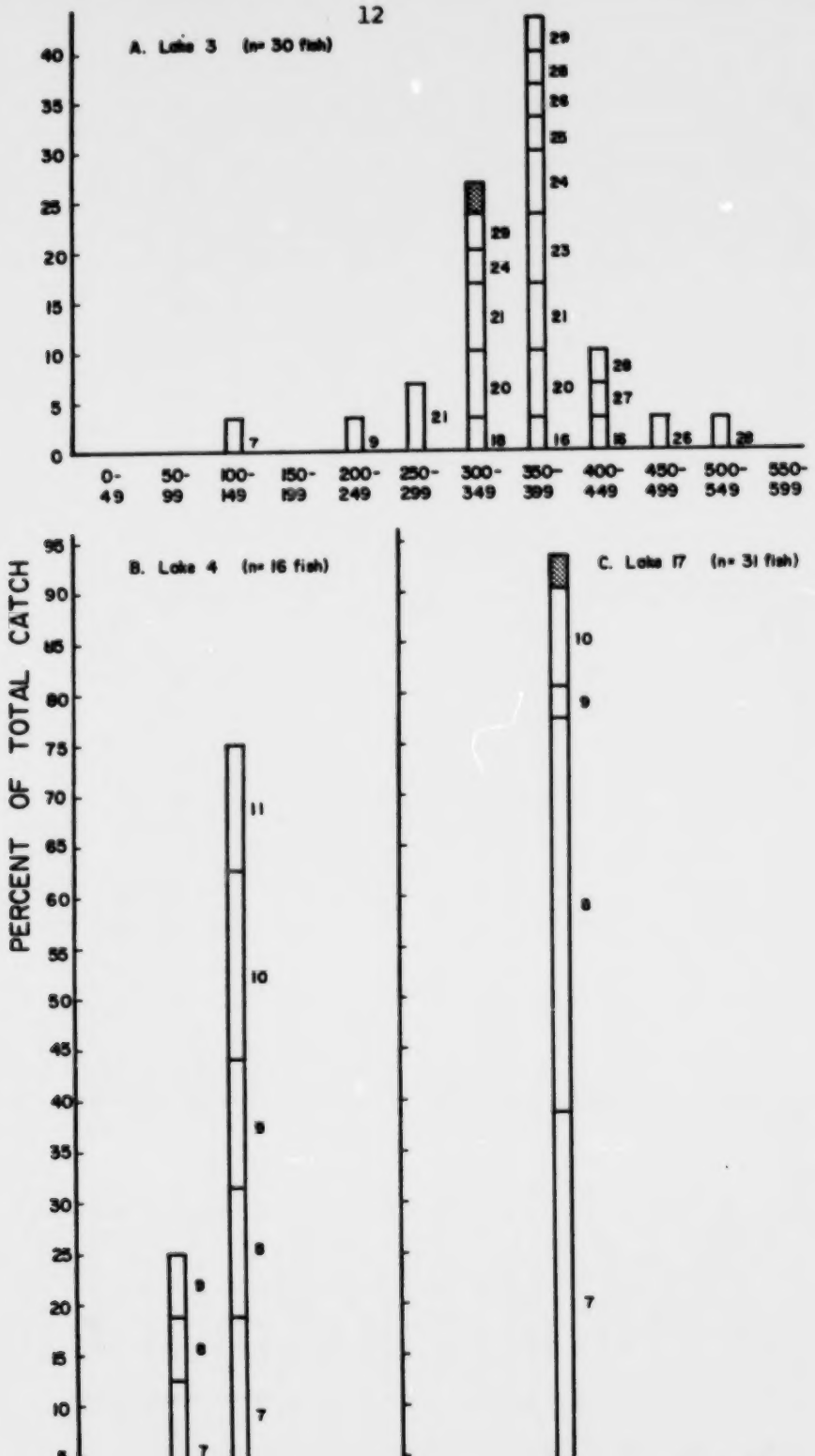



Figure 3. Age-frequency distribution by length class in the catches of Arctic charr, *Salvelinus alpinus*, from lakes 3 (75°05'N, 88°15'W), 4 (74°57.5'N, 88°15'W) and 17 (75°10'N, 91°42'W) on Devon Island, N.W.T. (Fig. 2; Tables 1, 2, 19)

$SO_4$ levels.

Dwarf charr (91-112 mm) ranging in age from 7-11 years, were the only fish caught in the smallest of these plateau lakes (Table 1, 2; Fig. 3B). Female fish aged 7 years and males aged 8 years were fully mature though only 96 mm long. Another lake (loc. 17) on the west end of Devon Island supports a similar population of charr although several slightly larger older individuals were caught (Fig. 3C). An adjacent lake (loc. 18) contains a wider size and age range of fish but the population is remarkably old and slow growing (Table 1). The youngest mature fish were aged 22 and 24 years for males and females respectively (Table 2). Fish in these lakes were generally only in fair condition (Table 1). Chironomid pupae and hydracarina were the main food items and many of the fish in lake 18 (Fig. 2) were parasitized by *Diphyllobothrium sp.* encysted in the gut wall and by gut tapeworms.

Charr were caught in 5 of the 7 coastal lowlands lakes sampled. Lakes on the Truelove Lowland (Fig. 2; loc. 10, 11 and 15) were ice free and their shores were carpeted with low vegetation. Each lake contained charr. Northeastwards on Cape Sparbo, a similar ice free lake (loc. 14) did not yield any charr. The lake was shallow and in winter may freeze to the bottom. Three other deep lakes on coastal lowlands (loc. 6-8) to the southwest were nearly ice covered during early August. Their shores were sparcely vegetated and only the lakes nearest the coast (loc. 7, 8) contained charr.

Bechel Lake (loc. 11) was the only Devon Island lowlands lake with vegetated shores where water chemistry and zooplankton samples were taken. Dissolved organic carbon, potassium, calcium and sulphate concentrations were high compared to other lakes sampled (Table 4). Nutrients, including chlorophyll A, were present in higher concentrations than in other lakes sampled on Devon Island. Crustacean zooplankton were more abundant than in plateau and polar desert lakes sampled and concentrations resembled those found in Baffin Island lakes with vegetated shores (Tables 3 and 16). Four species of crustacean zooplankton were caught in Bechel Lake: *Cyclops vicinus, Bosmina longirostris, Chydorus sphaericus,* and a harpacticoid species. There was a rotifer bloom in the lake at the time of sampling and rotifers were abundant (Table 3).

Charr in Bechel (loc. 11) and Fish (loc. 10) lakes on the Truelove Lowland appeared, from their modest size and old age, to be strictly lake dwelling (Table 1; Appendix II, Table 19). However, a single large (622 mm, 3100 g) ripe and running female charr, only 22 years old, was taken from Fish Lake. It was in good condition (1.29) but was heavily parasitized by *Diphyllobothrium sp.*, suggesting that it had not been to sea that year (Dick and Belosevic 1981). Nichol (unpubl. data) also found large young charr in Fish Lake that were not present in nearby Immerk Lake (loc. 15), while Minns (1977) did not catch large charr in either of the similar lakes. These large fish may be anadromous although the shallow outlet from Fish Lake must make migrations difficult or impossible during low water years. A greater weight of charr was caught per unit of fishing effort in the Truelove Lowland lakes (>34.1 kg of fish/100 net m/24 h) than elsewhere on the island (<16.6 kg of fish/100 net m/24 h).

Table 3. Zooplankton species and their abundance (mean number of individuals per litre) in three lakes on Devon Island.

| Sampling Site (Fig. 2) | 4 | 11 | 16 |
|---|---|---|---|
| Date | 31/7/80 | 8/8/80 | 9/8/80 |
| Depth (m) | 5 | 6 | 12 |
| Number of Samples | 3 | 5 | 3 |
| Ph. Arthropoda | | | |
| Cl. Crustacea | | | |
| SCl. Copepoda | | | |
| O. Calanoida | | | |
| *Limnocalanus macrurus* | | | 0.01 |
| O.Cyclopoida | | | |
| *Cyclops vicinus* | 0.01 | 0.02 | |
| Cyclopidae copepodids | | 1.23 | 0.01 |
| Cyclopidae nauplii | <0.01 | 2.87 | 0.03 |
| O. Harpacticoida | | 0.58 | 0.01 |
| SCl. Branchiopoda | | | |
| O. Diplostraca | | | |
| SO. Cladocera | | | |
| *Bosimina longirostris* | | 2.90 | 0.12 |
| *Chydorus sphaericus* | | <0.01 | |
| *Daphnia longiremis* | <0.01 | | |
| Total ind/L | 0.01 | 7.60 | 0.18 |
| Number of Species | 2 | 4 | 4 |
| Ph. Rotifera | 0.90 | 224.10 | 10.60 |

Table 4. Water chemistry data (means of n samples) for three Devon Island Lakes.

| Sampling Site (Fig. 2) | 4 | 11 | 16 |
|---|---|---|---|
| Coordinates | 74°57.5'N, 88°15'W | 75°39'N, 84°28'W | 75°33'N, 89°53'W |
| Date | 31/7/80 | 8/8/80 | 9/8/80 |
| **Field Data** | | | |
| Surface water temperature (°C) | 6.0 | 8.0 | 5.5 |
| Depth (m) | 5 | 6 | 12 |
| Time of day (h) | 1500 | 1300 | 1215 |
| Light Conditions | overcast | overcast | scattered cloud |
| Secchi depth (m) | 5 | 5 | 10 |
| Secchi color | pale turquoise | aquamarine | pale blue green |
| **Laboratory Data** | | | |
| Number of Samples (n) | 4 | 4 | 4 |
| pH | 7.87 | 8.06 | 7.80 |
| Conductivity at 25°C (µS/cm) | 200 | 260 | 120 |
| Total dissolved nitrogen (µg/L) | 162 | 288 | 150 |
| Total dissolved phosphorus (µg/L) | 11 | 10 | 6 |
| Dissolved organic carbon (µMole/L) | 175 | 375 | 145 |
| **Nutrients (µg/L)** | | | |
| Suspended nitrogen | 30 | 54 | 15 |
| Suspended phosphorus | <1.5 | 3.2 | <1 |
| Suspended carbon | 75 | 242 | 23 |
| Chlorophyll A | 0.18 | 0.42 | 0.12 |
| **Major Ions (mg/L)** | | | |
| Sodium | 2.10 | 4.07 | 2.30 |
| Potassium | 0.20 | 0.68 | 0.05 |
| Calcium | 28.6 | 28.6 | 18.4 |
| Magnesium | 5.3 | 15.3 | 3.14 |
| Chloride | 1.4 | 4.1 | 1.8 |
| Sulphate | 8.6 | 3.4 | 0.5 |
| **Heavy Metals (µg/L)** | | | |
| Strontium | | | 16.8 |

Although charr were only caught in two of three deep coastal lakes with vegetated shores south of Truelove Lowland, they almost certainly inhabit all three lakes. Lake 7 has a good outlet to the sea and contains anadromous charr that are utilized by the Inuit (Kristofferson unpubl. data). No large charr were caught during brief netting in the lake, suggesting that the majority are at sea during early August. Charr were present in lakes above (loc. 5) and below (loc. 7) the lake (loc. 6) which did not yield fish (Fig. 2). There were charr in another nearby coastal lake (loc. 8). All of these lakes remained nearly ice covered during the first week of August.

There are 3 large lakes at the head of Thomas Lee Inlet with good outlets to the sea. All are situated on polar desert and surrounded by steep hills. They have sandy or pebbled shores and both of the southernmost lakes were still nearly ice covered on the ninth day of August. The third lake (Fig. 2, loc. 16) was nearly ice free. It supports domestic and sport fisheries and may have commercial fishing potential. Lake water analyses showed low nutrient levels and low potassium and sulphate concentrations (Table 4). Four species of crustacean zooplankton inhabit the lake: *Limnocalanus macrurus*, a cylopodid, a harpactiocoid and *Bosmina longirostris*. They were not abundant and rotifers were only slightly more abundant (Table 3).

Both anadromous and lake dwelling charr populations inhabit the lake at the head of Thomas Lee Inlet (Fig. 2, loc. 16). Anadromous charr were characterized by high bone strontium levels (>244 µg/g), good growth rates, large maximum size (705 mm, 3800 g), and good condition factors (>0.95; Table 1; Appendix II, Table 19; Appendix III, Table 23). Lake dwelling fish were in poorer condition (<0.88), grew slowly to a smaller maximum size (411 mm, 580 g), and had less Sr in their bones (<70 µg/g). Catch per unit effort was low in the lake both in terms of the number and weight of fish caught (16.8 fish/100 net m/24 h, 12.5 kg of fish/100 net m/24 h), probably because a large portion of the population was feeding at sea. Chiromomids and fish were the main food items and some fish hosted *Diphyllobothrium sp.*, although at low levels of infection. The youngest mature fish was a 7 year old male and one large female charr was ripe and nearly ready to spawn in mid-August (Table 2).

Along the island's northern coast, three lakes (fig. 2, loc. 5, 9,12) were sample, and were isolated from both plateau and lowland by steep cliffs. All of the lakes were fed by streams from the plateau and had patches of vegetation on their shores. Charr were caught in the largest lake (loc. 5), which was nearly ice covered, and in one of the smaller lakes (loc. 12). Fish in the larger lake showed a wide range in size and age (Table 1). For a given size their ages were similar to fish in the large plateau lake (loc. 3) and the Truelove Lowland lakes (loc. 10, 11). The youngest mature fish caught were 14 and 15 years of age for males and females respectively (Table 2). There were dwarf charr in the smaller lake (loc. 12) although larger charr less succeptible to capture in hoopnets may also have been present (Appendix II, Table 19).

Nelson Lake on Cornwallis Island is situated on sparsely vegetated polar desert. It supports a thriving population of lake-dwelling Arctic charr that are utilized by Resolute Inuit.

A typical polar desert lake on the plateau of Cornwallis Island. Ice still partially covered the lake in early August, 1980.

## 2. CORNWALLIS ISLAND

*General Description:*

Cornwallis Island is a polar desert with a mean annual temperature of -16.6°C and precipitation of 13.5 cm (Resolute; Wedel and Way 1976). Broken dolomite and limestone rock cover most of the islands surface which is practically devoid of vegetation. On the eastern and southeastern coasts, cliffs rise abruptly from sea-level to an average elevation of 300 m, levelling to form an undulating plateau which covers the eastern two-thirds of the island (Fig. 4). The plateau is in a geologically youthful stage of development as the streams are actively incising channels and eroding headwards. Eastward flowing streams are generally characterized by steep gradients, canyons, and waterfalls. Between the streams are large areas of plateau with no apparent drainage lines and few lakes (Thorsteinsson 1958). West and northwest from the plateau the land becomes more rugged and elevation above sealevel decreases. Westward draining streams are generally larger and more integrated than other streams on the island but even larger rivers, such as the Allen, freeze solid in winter (Inland Waters Directorate 1979). The northwest corner of Cornwallis Island, bordering Pullen Strait, is a lowland dotted with shallow lakes and raised beaches.

Recent settlement on Cornwallis Island began in 1947 with the establishment of a weather station (Riewe 1976). This was supplemented in 1949 by the construction of an airfield which was operated by the R.C.A.F. until its take-over in 1964 by the Department of Transport. Today, airbase personnel number between 250 and 700 persons, depending on season. The community of Resolute, distinct from the airbase, was established in 1953 by Inuit families from Port Harrison, Quebec and Pond Inlet (Fig. 1). They have since been joined by several more families from those areas and by families from Great Whale River, Quebec and Somerset Island. Initially most of the Inuit families at Resolute supported themselves by hunting and trapping. Today, the economy is primarily wage based and the 200 residents, mostly Inuit, hunt and trap only part-time.

*Domestic, Commercial, and Sport Fishing:*

Arctic charr provide a welcome change of diet for Resolute Inuit but few lakes in the Resolute area support populations of large anadromous charr. In consequence, fishermen must undertake long trips to catch the larger anadromous fish or satisfy themselves with small landlocked charr present in lakes near the community. In either case, fishing is both expensive and/or time consuming considering the returns (Bissett 1967c, Riewe 1976).

Inuit remaining in Resolute for the summer are limited by rough terrain to domestic fishing near Resolute or at locations accessible by boat. Small charr are angled in isolated lakes near the community (Fig. 4; loc. 1, 6-10). Eleanor Lake (loc. 13) is occasionally fished during August if ice conditions in Wellington Channel permit boat travel (Bissett 1967c, Riewe 1976).

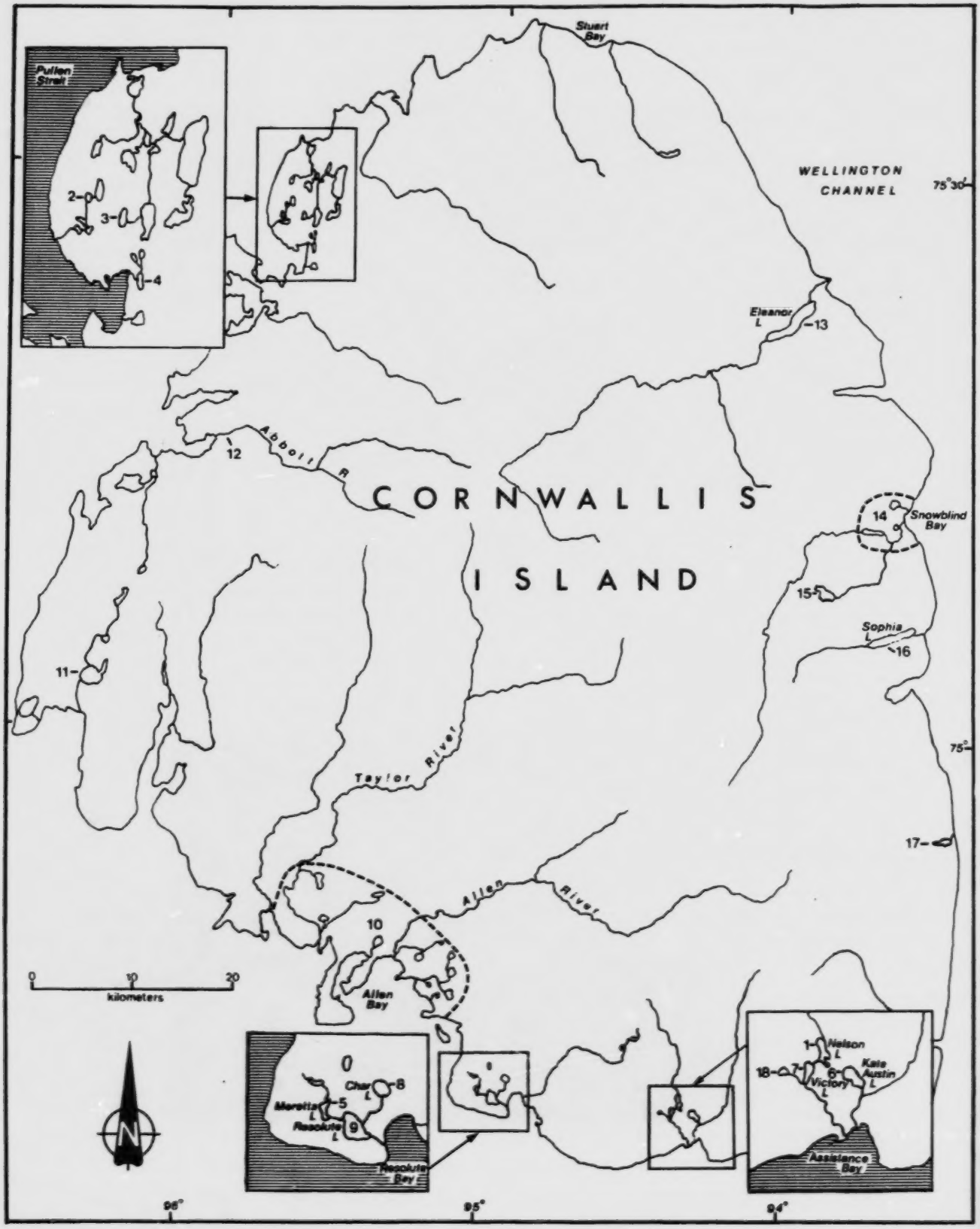



Figure 4. Locations on Cornwallis Island, N.W.T. sampled during the 1980 survey (1-5) or investigated during previous research (1, 5-18).

Although the Inuit catch large anadromous charr in Eleanor Lake, the distance travelled, short time spent actually fishing, inefficient fishing methods, and conflicts with employment at Resolute airbase combine to make these trips uneconomic (Bissett 1967c).

Union River and Creswell Bay on Somerset Island (Fig. 6) are traditional summering areas for Resolute Inuit who travel to and fro by snowmobile in the spring and fall over the ice. During the fall charr runs in both 1975 and 1976, they speared about 3000 kg round weight of fish (de March et al. 1977). This appears to be the most productive fishery readily accessible from Resolute.

Between April and June and during October when snow, ice, and lighting conditions permit wide-ranging snowmobile travel, Inuit hunters and trappers fish lakes over a wide area (Bissett 1967c, Riewe 1976). Many lakes on Cornwallis Island are fished regularly (Fig. 4; loc. 8-11, 14-17) especially Eleanor Lake (loc. 13) and the Trafalgar Lakes (loc. 1, 6, 7, 18). On occasion, Grise Fiord Inuit have also travelled to Eleanor Lake to catch large anadromous charr (Freeman 1976). Hunters and trappers from Resolute also fish 'Bedford Bay Lake' on the south coast of Bathurst Island, inner Brown Bay on Prince of Wales Island, and numerous lakes and rivers along the west coast of Somerset Island from Four Rivers Bay north to Aston Bay (Fig. 6, Riewe 1976). Stanwell-Fletcher Lake, the Union River which drains it, and Creswell Bay are fished regularly for anadromous charr (Fig. 6). Fish are caught by attracting them, with shiny jigs, to holes cut in the ice where they are speared with leisters (Bissett 1967c, Riewe 1976). Only a limited amount of fish can be transported to Resolute because caribou and seal often constitute the bulk of snowmobile loads returning from hunting expeditions (Bissett 1967c). A reduction in the number of sled dogs since the mid 1960's has meant that virtually all of the fish caught are consumed by the Inuit.

One Resolute family, the Idlouts, commercially fishes Stanwell-Fletcher Lake (Fig. 6) every fall using 14 cm stretched mesh gillnets (de March, pers. comm.; de March and Eddy 1976). The commercial charr production reported from Resolute for the 1978-79 fishing season was 340 kg (Kristofferson pers. comm.). Commercially caught charr are distributed through the Resolute Co-operative or sold privately.

Sport fishing by airbase residents is generally limited to summer angling in lakes near the base (Fig. 4, loc. 8-10). The 1978-79 sport fishing production estimate of 11 kg (Kristofferson unpubl. data) is probably conservative.

*Previous Research:*

Char Lake (Fig. 4, loc. 8) was the site of a detailed study by the IBP into the limnology and energy flow of a High Arctic Lake (Rigler 1975). A variety of scientific papers were published on the biology, population dynamics, physiology and bioenergetics of the landlocked charr inhabiting the lake (MacCallum 1971, 1972; Holeton 1974; Rigler 1975; Johnson 1976). The

IBP investigation also encompassed studies of zooplankton (Roff and Carter 1972, Rigler et al. 1974, Rigler 1975) and water chemistry (Schindler et al. 1974a). MacCallum (1971, 1972), the principal fish biologist, also caught charr in nearby Meretta, Resolute, and Kate Austin lakes (Fig. 4). Population dynamics of landlocked Arctic charr in Nelson Lake have been studied over the long term by Johnson (1980, 1981, in prep.).

There have been two previous limited synoptic fish surveys of Cornwallis Island. de March and Eddy (1976) caught charr in Victory Lake (Fig. 4, loc. 7) and fourhorn sculpin *(Myoxocephalus quadricornis)* in Sophia Lake but did not catch fish in the Abbot, Taylor or Allen rivers. McAllister and Aniskowicz (1976) reported on the sculpins caught in Sophia Lake. Sekerak and Graves (1975) caught charr in Eleanor, Hardy (loc. 18), and Nelson lakes.

Meretta Lake is the only studied example of High Arctic eutrophication (Kalff and Welch 1974, Schindler et al. 1974b). In 1970-72 the charr population of the lake seemed to be dwindling (MacCallum 1971, 1972).

*Survey Results:*

Five Cornwallis Island lakes were sampled, three on the northwestern coastal lowland (loc. 2-4) and Nelson (loc. 1) and Meretta (loc. 5) lakes along the southern coast (Fig. 4). The lakes are little more than shallow depressions in the polar desert and all lie within 30 m elevation of sealevel. Their outlets are shallow but might allow upstream fish passage during periods of high runoff. A narrow band of moss borders the northern lakes but vegetation along the shores of Nelson Lake is exceedingly sparse. Meretta Lake has a ring of detritus at water level but again shoreline vegetation is sparse. While many lakes on the island are ice covered year-round, all of the lakes sampled were ice free by late July. Arctic charr, the only fish caught, were found in all but Meretta Lake.

Charr in each of the lakes appeared to be from strictly lake dwelling populations. They were small and old and in poorer condition than most anadromous charr stocks (Appendix II, Table 20; Peet 1975, 1976; Johnson 1980). Bone Sr measurements from fish in the northern lakes fell between 88 and 131 µg Sr/g, intermediate between measurements for lake dwelling ($\bar{x}$ = 55 µg Sr/g) and anadromous ($\bar{x}$ = 251 µg Sr/g) charr from Devon Island (Appendix III, Table 23, loc. 16; Gaboury 1980). These intermediate measurements probably result from high Sr levels in the lake water ($\bar{x}$ = 72.8 µg Sr/L; Table 8) which would lead to higher than expected dietary Sr intake and thereby higher bone Sr concentrations in lake dwelling charr. While these observations point to the populations being landlocked, they do not preclude the possibility that anadromous fish from the lakes were still at sea.

The populations of charr in Nelson and the three northern lakes show differences in their length distributions and length-weight relationships. There is a preponderance of small and large fish in the northern lakes, giving their populations bimodal length distributions (Fig. 5B, C). While intermediate

Table 5. Summary of age, length, and weight data for Cornwallis Island Arctic charr.

| Sampling Location | | | Length (mm) | | Weight (g) | | Condition factor | | Length-Weight Relationship** | | | | Age (y) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site # | Coordinates | N | Mean (Range) | S.D. | Mean (Range) | S.D. | Mean | S.D. | y intercept (log a) | slope (b) | S.D. of b | $r^2$ | n | Mean (Range) | S.D. |
| 1 | 74°42'N, 94°18'W | 110 | 336 (152-540) | 62.8 | 365 (40-1840) | 244 | 0.867 | 0.094 | -4.876 | 2.925 | 0.049 | 0.971 | 97 | 14.8 (9-27) | 3.3 |
| 2 | 75°28'N, 95°44'W | 10 | 452 (252-556) | 91.3 | 905 (120-1580) | 469 | 0.876 | 0.111 | -5.474 | 3.156 | 0.189 | 0.972 | 9 | 16.4 (7-21) | 4.8 |
| 3 | 75°27.5'N, 95°42'W | 35 | 241 (104-438) | 91.7 | 187 (9.5-910) | 248 | 0.851 | 0.086 | -5.294 | 3.094 | 0.042 | 0.994 | 34 | 10.0 (3-27) | 7.5 |
| 4 | 75°26'N, 95°38'W | 42 | 352 (106-476) | 114.2 | 499 (10.5-920) | 309 | 0.874 | 0.112 | -5.369 | 3.122 | 0.044 | 0.992 | 39 | 13.6 (4-22) | 5.6 |

* Condition factor = weight in g·(fork length in mm)$^{-3}$·$10^5$
**log weight in g = b·log length in mm + log a

Table 6. Summary of sexual maturity data for Cornwallis Island Arctic charr

| | | | | Maturity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site # | Date | N | Sex | Immature | Mature | Near Ripe | Ripe | Running | Spent | Unknown | Age of Youngest Mature fish (y) | Length of Youngest mature fish (mm) |
| 1 | 1-3/8/80 | 51 | male | 23 | 21 | 7 | | | | | 12 | 374 |
| | | 56 | female | 14 | 34 | 6 | 2 | | | | 12 | 360 |
| | | 110 | total | 37 | 55 | 13 | 2 | | | 3 | | |
| 2 | 9-10/8/80 | 8 | male | 1 | 4 | 2 | 1 | | | | 12 | 360 |
| | | 2 | female | | 2 | | | | | | 17 | 456 |
| | | 10 | total | 1 | 6 | 2 | 1 | | | | | |
| 3 | 9-10/8/80 | 14 | male | 6 | 3 | 5 | | | | | 6 | 223 |
| | | 17 | female | 13 | 3 | 1 | | | | | 15 | 330 |
| | | 35 | total | 19 | 6 | 6 | | | | 4 | | |
| 4 | 9-10/8/80 | 19 | male | 1 | 12 | 6 | | | | | 12 | 370 |
| | | 21 | female | 9 | 6 | 4 | 2 | | | | 13 | 410 |
| | | 43 | total | 10 | 18 | 10 | 2 | | | 3 | | |

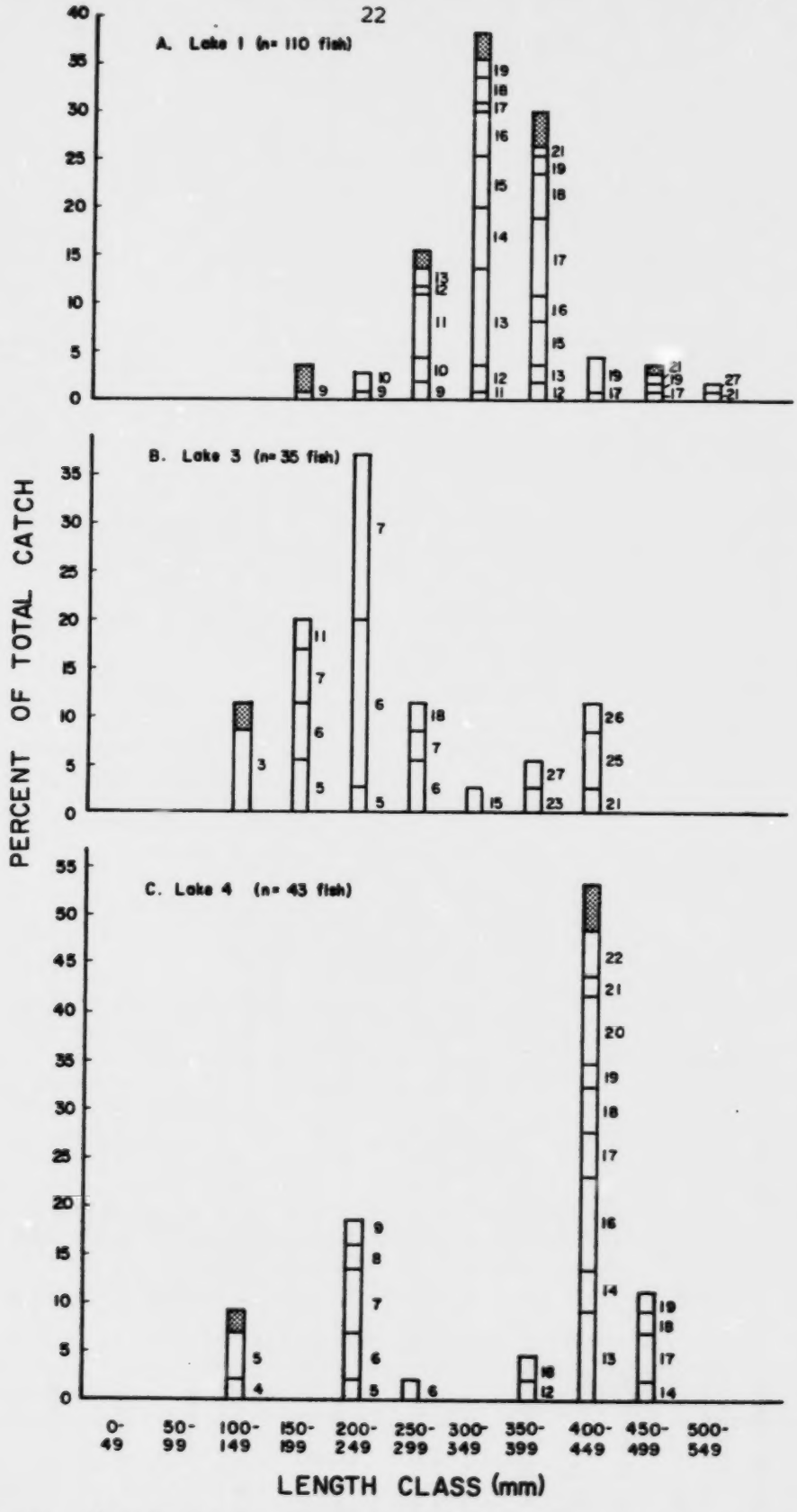



Figure 5. Age-frequency distribution by length class in the catches of Arctic charr, *Salvelinus alpinus*, from lakes 1 (74°42'N, 94°18'W), 3 (75°27.5'N, 95°42'W), and 4 (75°26'N, 95°38'W) on Cornwallis Island, N.W.T. (Fig. 4; Tables 5, 6, 20).

year class failures may account for some of the biomodality, variable growth rates both within and between fish in the populations are probably the main causes. Nelson Lake has a unimodal population distribution although in 1962 it too was bimodal (Johnson in prep.). Year class failures are not apparent in the Nelson Lake population and growth rates of charr, while variable between fish may not change with time. Because of variable growth rates, the largest fish in Cornwallis Island populations are not necessarily the oldest (Fig. 5; Appendix II, Table 20). The length-weight relationship for Nelson Lake charr shows that short fish are heavier than their northern counterparts, while long fish are in poorer condition (Table 5). These condition differences may reflect the higher proportion of ripe and ripening fish in the northern population (n=87), 24% compared with 14% in Nelson Lake (n=110). The length-weight relationship calculated for Nelson Lake agrees closely with than calculated using 1962 data from the lake (Johnson 1980). Relationships calculated for the northern lakes agree closely with those from Fiona and Sunday lakes, on Somerset Island.

Charr in the Cornwallis lakes generally mature by age 12 years although some precocious males mature by age 6 years (Table 6). Sex ratios (M/F) slightly favor females in Nelson Lake (0.91) and males in the northern lakes (1.025). The presence of ripe but not running fish during early and mid August suggest that spawning begins in late August or early September. Based on the ratio of mature to ripening fish (2.36) Cornwallis charr may spawn only once every 2 to 3 years.

During mid August, charr feed mainly on chironomid larvae and pupae although some hydracarina and charr are also eaten. Fish in the Cornwallis Island lakes were generally well fed since only 18% of Nelson Lake charr (n=110) and 44% of the northern lakes charr (n=87) had empty stomachs. Parasitism is common in both areas of the island. In 1962, 22% of Nelson Lake charr hosted *Diphyllobothrium sp.* encysted in their gut walls; 5% had tapeworms in their gut or pyloric caecae; 7% had gill parasites; and 2% had nematodes in the body cavity, caecum, or gut. By comparison, one of the northern lakes populations (loc. 2, n=10) had a 10% incidence of gut cysts and 10% incidence of swimbladder parasitism, another population had no apparent parasites (loc. 3, n=35), while 5% of the third had gut cysts and 2.5% harboured tapeworms (loc. 4, n=42, Fig. 4).

Nelson Lake appears to be less productive than the northern lowland lakes. Zooplankton in the lake were less abundant and the nutrients and major ions were present in lower concentrations (Table 7 and 8). Numbers and weights of fish caught per unit effort were also lower in Nelson Lake (23.5 fish/100 net m/24 h, 8.6 kg/100 net m/24 h) than in the northern lakes (57.6 fish/100 net n/24 h, 23.3 kg/100 net n/24 h), although this may be an artifact of different net set times.

Sewage effluents from Resolute airbase have made Meretta Lake eutrophic Total dissolved organic carbon concentrations in the lake are higher (Table 8, loc. 5), than those in Bechel (Table 4, loc. 11) and Erichsen (Table 17, loc. 8) lakes which, unlike Meretta, are both surrounded by vegetation. Other dissolved and suspended solids are present at concentrations 2 to 7 fold higher than those in other lakes sampled. Suspended

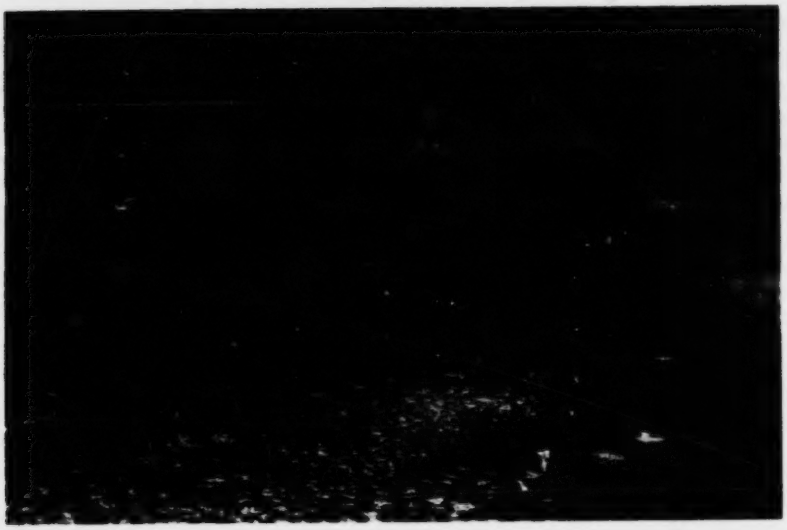
Table 7. Zooplankton species and their abundance (mean number of individuals per litre) in three lakes on Cornwallis Island.

| Sampling Site (Fig. 4) | 1 | 4 | 5 |
|---|---|---|---|
| Date | 1/8/80 | 10/8/80 | 12/8/80 |
| Depth (m) | 8 | 5 | 3 |
| Number of Samples | 2 | 4 | 4 |
| Ph. Arthropoda | | | |
| Cl. Crustacea | | | |
| SCl. Copepoda | | | |
| O. Calanoida | | | |
| *Limnocalanus macrurus* | 0.01 | 0.62 | |
| O. Cyclopoida | | | |
| *Cyclops scutifer* | | | 0.01 |
| Cyclopidae copepodids | | | 4.83 |
| Cyclopidae nauplii | 0.03 | | 15.70 |
| O. Harpacticoida | | 0.02 | 0.03 |
| Total ind/L | 0.04 | 0.64 | 20.57 |
| Number of Species | 2 | 2 | 2 |
| Ph. Rotifera | 0.38 | 0.64 | 2087.30 |

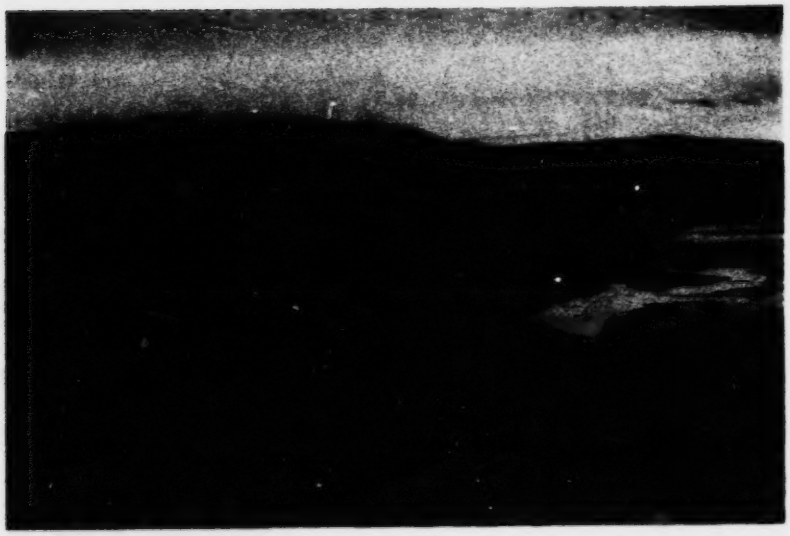
Table 8. Water chemistry data (means of n samples) for three Cornwallis Island Lakes.

| Sampling Site (Fig. 4) | 1 | 4 | 5 |
|---|---|---|---|
| Coordinates | 74°42'N, 94°18'W | 76°26'N, 95°38'W | 74°41.5'N, 94°59'W |
| Date | 1/8/80 | 10/8/80 | 12/8/80 |
| **Field Data** | | | |
| Surface water temperature (°C) | 7.5 | 5.0 | 4.3 |
| Depth (m) | 8 | 5 | 3 |
| Time of day (h) | 900 | 1100 | 1900 |
| Light Conditions | bright sun | overcast | overcast |
| Secchi depth (m) | 7 | 5 | 3 |
| Secchi color | light aquamarine | aquamarine | blue green |
| **Laboratory Data** | | | |
| Number of samples (n) | 2 | 4 | 4 |
| pH | 7.69 | 7.78 | 7.28 |
| Conductivity at 25°C (µS/cm) | 130 | 210 | 185 |
| Total dissolved nitrogen (µg/L) | 245 | 172 | 542 |
| Total dissolved phosphorus (µg/L) | 8 | 5 | 34 |
| Dissolved organic carbon (µMole/L) | 205 | 285 | 418 |
| **Nutrients (µg/L)** | | | |
| Suspended nitrogen | 30 | 50 | 224 |
| Suspended phosphorus | <1 | 3.8 | 29.8 |
| Suspended carbon | 75 | 205 | 1205 |
| Chlorophyll A | 0.10 | 0.55 | 2.18 |
| **Major Ions (mg/L)** | | | |
| Sodium | 2.54 | 8.28 | 12.5 |
| Potassium | 0.22 | 0.38 | 0.58 |
| Calcium | 19.2 | 25.8 | 16.8 |
| Magnesium | 3.31 | 3.95 | 4.73 |
| Chloride | 2.0 | 14.4 | 19.8 |
| Sulphate | 1.6 | 2.6 | 2.5 |
| **Heavy Metals (µg/L)** | | | |
| Strontium | | 72.8 | |

phosphorus concentrations were particularly high and chlorophyll A concentrations were double those of other lakes tested. Meretta Lake had a strikingly high abundance of rotifers *(Deratella sp., Polyarthra sp.)*, up to 2087 individuals/L, but only a single species of crustacean, *Cyclops scutifer* (Table 7, loc. 5). No fish were caught in the lake (Appendix II, Table 20).



Steep coastal cliffs are common to Devon, Cornwallis, Somerset and northern Baffin Islands. The east coast of Somerset Island looking south.



Stanwell-Fletcher Lake on Somerset Island is the largest High Arctic lake in the area and is the site of an important Inuit domestic fishery.

## 3. SOMERSET ISLAND

*General Description:*

A level sedimentary plateau, 300-400 m in elevation, composed principally of carbonates, gneisses, metasediments and sandstones covers most of Somerset Island (Villiers 1968, Wedel 1978). It rises in sheer cliffs from the sea and gradually slopes downwards from the northeast corner, only to rise to a height of 500 m along the island's extreme western edge. The plateau is deeply incised by rivers but lakes are confined exclusively to coastal areas. River valleys contain most of the vegetation in this region. Like Cornwallis Island, Somerset Island is a polar desert where the dominant vegetation species are lichens, avens, and saxifrages. In many cases, subsurface soils beneath plant communities appear to be ice rich. Southwest of the plateau lies a rugged upland of Precambrian rock, 300 m high, which extends from the mainland through Boothia Peninsula. Between the plateau and the ridge is a trough wherein lie the islands major lakes, Fiona and Stanwell-Fletcher. Union River, which drains Stanwell-Fletcher Lake, is the only stream on Somerset Island which is reported to occasionally maintain winter flow (Fig. 6; de March and Eddy 1976, Wedel 1978).

A rugged upland hill region of Precambrian gneissic and sedimentary metamorphic rocks characterize southwestern Somerset Island and northern Boothia Peninsula (Wedel 1978). Local relief is so severe that this area resembles mountainous rather than typical Shield terrain. Lakes are long, narrow and steep-sided due to a series of east-west trending faults in the bedrock. Watercourses in the area are marked by numerous rapids and waterfalls. Southwards the land rises to form a rolling plateau which covers most of Boothia Peninsula. Rising to nearly 500 m near its centre, the plateau falls off northeast and southwest through a rugged upland and the Precambrian bedrock disappears beneath coastal lowlands of more recent sedimentary strata. Southern Boothia Peninsula, in the vicinity of Spence Bay is low, lake strewn, and dotted with knobby granitic hills. It has been heavily glaciated and is covered by glacial drift. A number of large lakes dominate the landscape north of Spence Bay and river valleys are generally shallow and poorly defined. Bedrock outcrops create rapids in many of the rivers. Vegetation cover on Boothia Peninsula, while discontinuous and sparse, is more extensive than further north, particularly in poorly drained areas (Lawrence et al. 1977). Lichens and heather are the predominant plant species.

*Domestic, Commercial, and Sport Fishing:*

During hunting and trapping expeditions, Inuit from Resolute catch Arctic charr in a variety of lakes and rivers along the east coast of Somerset Island (Fig. 6; Bissett 1967a, de March and Eddy 1976, Riewe 1976). Travelling by snowmobile in May and June, they fish through holes in the ice, using shiny jigs to attract fish to the holes where they are speared with leisters. Several Inuit families from Resolute also spend their summers

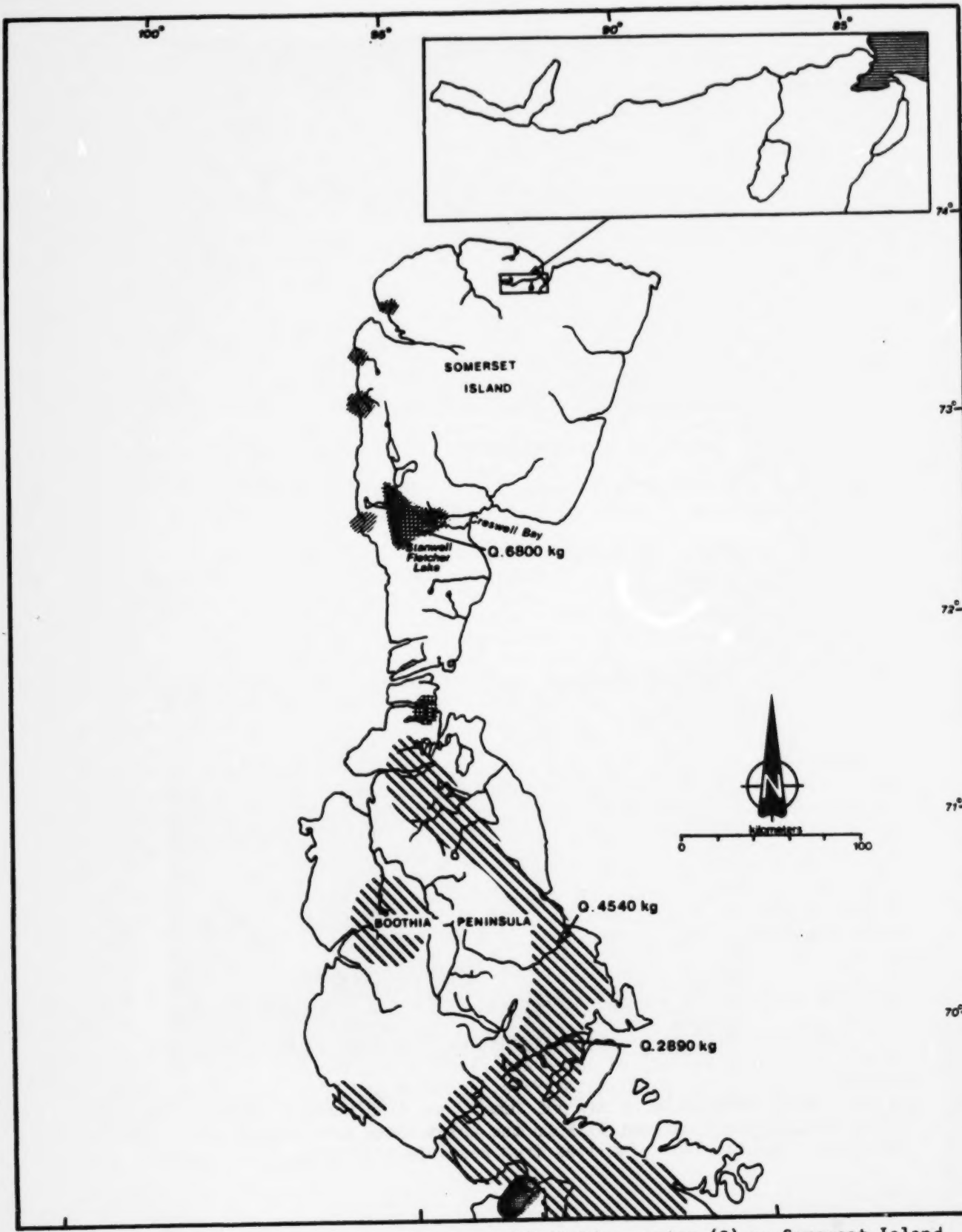



Figure 6. Domestic fishing areas and commercial fishing quotas (Q) on Somerset Island and Boothia Peninsula, N.W.T. utilized by residents of Resolute ▨, Arctic Bay ▦, Spence Bay ▥, and Gjoa Haven ■

in the Creswell Bay area. During early spring and late fall they jig through the ice of Stanwell-Fletcher Lake but most of the fish, 3000 of an estimated 4000 kg annually, are speared in Union River, during the fall upstream run of large anadromous charr into Stanwell-Fletcher Lake (de March et al. 1977). Freeman (1976) also has reported that Arctic Bay residents fish Stanwell-Fletcher Lake.

Inuit from Spence Bay fish for anadromous and landlocked Arctic charr, lake trout *(Salvelinus namaycush)*, and lake whitefish *(Coregonus clupeaformis)* in rivers and lakes on Boothia Peninsula (Fig. 6; Brice-Bennett 1976). Boothia Isthmus, the narrowing of the peninsula near Spence Bay, is the primary domestic fishing area. Fish are gillnetted during the summer and jigged through holes in the ice during spring and fall. Arctic charr are the preferred food fish (Larue pers. comm.). Spence Bay residents also jig for cod in Willerstedt Inlet and Spence and Josephine Bays along the west coast near the community (Brice-Bennett 1976). Fishermen from Gjoa Haven, on King William Island, occasionally fish the lakes south of Spence Bay.

Stanwell-Fletcher Lake is the only lake on Somerset Island that has been assigned a commercial quota on Arctic charr fishing (Fig. 6). The 6800 kg (round weight) quota is fished by a family from Resolute, who use 14 cm stretched measure gillnets to harvest between 340 and 1500 kg of charr annually (de March et al. 1977, Kristofferson pers. comm.). These charr are sold privately or distributed through the Resolute Co-operative.

Two areas on Boothia Peninsula have been assigned commercial Arctic charr quotas (Fig. 6). The Agnew River, Illaunnallic Bay area (70°40'N, 92°40'W) has a 4540 kg (round weight) quota on anadromous charr while Lord Lindsay Lake (70°10'N, 92°25'W) has a quota of 2890 kg (round weight). Both quotas are utilized by Spence Bay fishermen but only Lord Lindsay Lake is fished regularly. At the fishermen's request, that quota has been opened annually since at least 1977 when 3400 kg of charr were caught (Kristofferson unpubl. data). Agnew River was last opened for commercial fishing during the 1977-78 season. Catch data is not available for this area or for sports fishing in the Spence Bay region.

*Previous Research:*

Somerset Island and Boothia Peninsula are both on the proposed Polas Gas pipeline route and, for this reason, have recently undergone a series of fisheries and limnological studies. The purposes of these studies were to predict the possible impact of pipeline construction on aquatic ecosystems and, to form a baseline of data for establishing the effects of a Polar Gas pipeline, should one be constructed, on aquatic ecosystems.

Stanwell-Fletcher Lake, the largest High Arctic lake in the area and site of an important Inuit fishery, was the most intensely studied site (Fig. 7, loc. 9; de March and Eddy 1976, de March et al. 1977). It is a deep cold monomictic lake typified by unstratified water of low ionic strength. Ice sometimes does not leave the lake and the resulting low light input coupled with low temperatures (<2.0°C) and low N and P budgets result in low primary

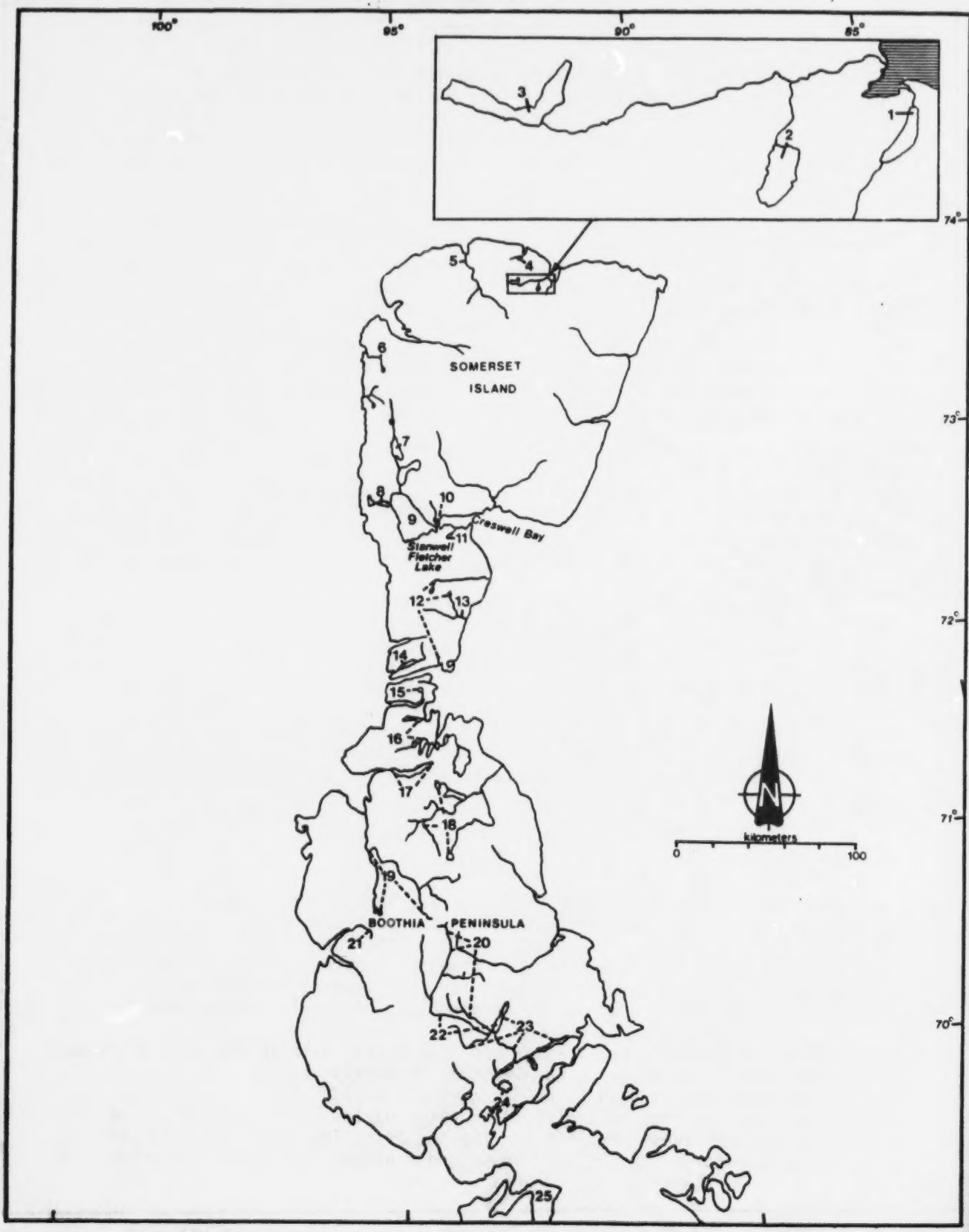



Figure 7. Locations on Somerset Island and Boothia Peninsula, N.W.T. sampled during the 1980 fish survey (1-3) or during previous research (1, 4-25).

production rates. Species diversity is low and fourhorn sculpin and Arctic charr are the only fish species known to have been caught in the lake.

Charr in Stanwell-Fletcher Lake show a wide range in their growth rates, age and size at maturity, and maximum size attainable, suggesting that both anadromous and strictly lake dwelling populations inhabit the lake. Primary foods of the charr are: in the lake, chironomid larvae and pupae and *Mysis relicta* and in the sea, the amphipod *Parathemisto libellula* and Arctic cod, *Boreogadus saida*. The charr mature as early as age 8 years and probably begin spawning in early September. Fry make extensive use of shallows and inflow areas for feeding and shelter and move to deeper water past about age 3 years. Since 1962 there has been a decline in the number of large charr, over 450 mm in fork length, in the population (Johnson 1975, de March et al. 1977). The population of anadromous charr is estimated at $9 \times 10^4$ fish having a round weight of $7 \times 10^4$ kg.

Synoptic surveys of Somerset Island, also connected with pipeline development, have discovered Arctic charr populations in many of the island's lakes and rivers. de March and Eddy (1976) caught charr at five locations (Fig. 7; loc. 1, 4, 6, 7 and 14) as did Sekerak and Graves (1975; loc. 5, 10, 12). Johnson (1976 and unpubl. data) found charr in Fiona and Sunday Lakes (loc. 7 and 11). Charr in McGregor Liard Lake (loc. 14) appear to be anadromous (de March and Eddy 1976).

Lakes and rivers on Boothia Peninsula were sampled during three separate pipeline studies. Sekerak and Graves (1975) travelled the length of the peninsula and caught charr at numerous locations (Fig. 7; loc. 16-22, 24). Ninespine stickleback, *Pungitius pungitius*, were also present in several of the systems (loc. 19 and 24) and lake trout were caught in another (loc. 22). Hatfield et al. (1977) caught charr, lake trout, ninespine stickleback, lake whitefish, and lake cisco *(Coregonus artedii)* in the Netsilik Lake area (loc. 25). More detailed studies which included water chemistry and stream profiles were performed by Lawrence et al. (1977) in the Amituryouak Lake and Sanagak Lake areas (loc. 17 and 23). There appeared to be anadromous charr in both systems and in Sanagak Lake (loc. 23) there were also lake trout.

The reports of de March et al. (1977) and Lawrence et al. (1977) both discuss the effects of disruptions on aquatic ecosystems. Stream blockages; sediment, sewage, and hydrocarbons additions to the water column; water and gravel removal; and increased fishing pressure on aquatic systems in the Somerset Island and Boothia Peninsula areas are all discussed.

*Survey Results:*

Three lakes were sampled on northern Somerset Island near Garnier Bay. The first, a cold (2 °C), deep (>23 m) coastal lake only slightly above sea-level, has a good outlet to the sea and contains anadromous and perhaps lake dwelling Arctic charr (Fig. 7, loc. 1). No fish were caught in the second lake located on the plateau, 160 m above sealevel. It is connected to the sea by a sheer cataract (loc. 2). The third and largest lake is 100 m

Table 9. Summary of age, length, and weight data for Somerset Island Arctic charr.

| Sampling Location | | | Length (mm) | | Weight (g) | | Condition Factor | | Length-Weight Relationship** | | | | Age (y) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site # | Coordinates | N | Mean (Range) | S.D. | Mean (Range) | S.D. | Mean | S.D. | y intercept (log a) | slope (b) | S.D. of b | $r^2$ | n | Mean (Range) | S.D. |
| 1 | 73°56'N, 92°15'W | 9 | 433 (129-690) | 185 | 1175 (18.5-3450) | 1092 | 0.936 | 0.089 | -5.350 | 3.123 | 0.042 | 0.999 | 9 | 15.4 (5-26) | 6.9 |
| 3 | 73°57'N, 92°52'W | 4 | 310 (103-580) | 243 | 677 (8.5-1880) | 887 | 0.840 | 0.104 | -5.380 | 3.128 | 0.026 | 0.999 | 4 | 13.0 (6-27) | 9.9 |

* Condition Factor = Weight in g·(Fork length in mm)$^{-3}$·$10^5$

**log weight in g = b · log length in mm + log a

Table 10. Summary of sexual maturity data for Somerset Island Arctic Charr

| Sampling | | | | Maturity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site # | Date | N | Sex | Immature | Mature | Near Ripe | Ripe | Ripe & Running | Spent | Unknown | Age of Youngest Mature fish (y) | Length of Youngest Mature fish (mm) |
| 1 | 13-14/8/80 | 5 | male | 1 | 4 | | | | | | | |
| | | 4 | female | 1 | 1 | 2 | | | | | 12 | 525 |
| | | 9 | total | 2 | 5 | 2 | | | | | 20 | 572 |
| 3 | 13-14/8/80 | 3 | male | 1 | 2 | | | | | | | |
| | | 1 | female | 1 | | | | | | | 13 | 451 |
| | | 4 | total | 2 | 2 | | | | | | | |

Table 11. Zooplankton species and their abundance (mean number of individuals per litre) in a lake on Somerset Island.

| | |
|---|---|
| Sampling Site (Fig. 7) | 1 |
| Date | 14/8/80 |
| Depth (m) | 23 |
| Number of Samples | 4 |
| Ph. Arthropoda | |
| Cl. Crustacea | |
| Scl. Copepoda | |
| O. Calanoida | |
| *Limnocalanus macrurus* | |
| Total ind/L | 0.25 |
| Number of Species | 0.25 |
| Ph. Rotifera | 1 |
| | 13.43 |

Table 12. Water chemistry data (means of n samples) for one lake on Somerset Island.

| | |
|---|---|
| Sampling Site (Fig. 7) | 1 |
| Coordinates | 73°56'N, 92°15'W |
| Date | 14/8/80 |
| Field Data | |
| Surface water temperature (°C) | 2.0 |
| Depth (m) | >23 |
| Time of day (h) | 1600 |
| Light Conditions | overcast |
| Secchi Depth (m) | 2.5 |
| Secchi color | pale blue green |
| Laboratory Data | |
| Number of samples (n) | 4 |
| pH | 7.68 |
| Conductivity at 25°C (µS/cm) | 140 |
| Total dissolved nitrogen (µg/L) | 140 |
| Total dissolved phosphorus (µg/L) | 8 |
| Dissolved organic carbon (µMole/L) | 65 |
| Nutrients (µg/L) | |
| Suspended nitrogen | 60 |
| Suspended phosphorus | 3.8 |
| Suspended carbon | 368 |
| Chlorophyll A | 0.55 |
| Major Ions (mg/L) | |
| Sodium | 2.77 |
| Potassium | 0.26 |
| Calcium | 21.8 |
| Magnesium | 2.28 |
| Chloride | 2.8 |
| Sulphate | 1.8 |
| Heavy Metals (µg/L) | |
| Strontium | 74 |

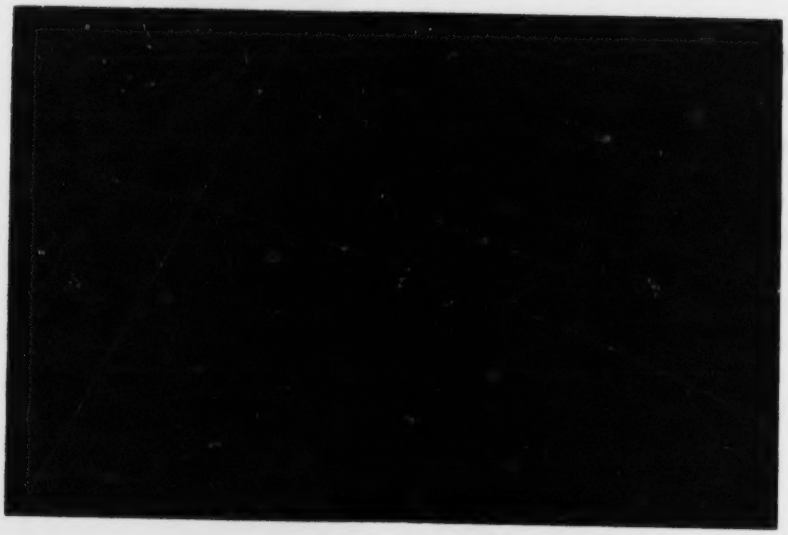
above sealevel, about 15 km inland, and also contains Arctic charr (loc. 3). The outlet to this lake, while long and rapid, does not appear to have obstructions sufficient to block charr migrations into the lake.

Charr caught at location 1 (Fig. 7) can be separated into two groups based on their bone strontium levels, growth rates, and conditions (Appendix II, Table 21; Appendix III, Table 23). One group, typified by a high level of bone Sr (>350 µg/g), fast growth rate, large maximum size, and good condition is probably anadromous. The other fish which grow more slowly, are in poorer condition, and have lower bone Sr levels probably dwell strictly within the lake. The bone Sr measurements were higher in these groups of charr than in similar fish from a lake on Devon Island (Section 1, loc. 16). The cause is probably higher concentrations of Sr in the lake water (74 µg/L) of Somerset Island (Fig. 7, loc. 1) and, because the lake is deep and lies near sealevel, suggests that the lake may have a chemocline.

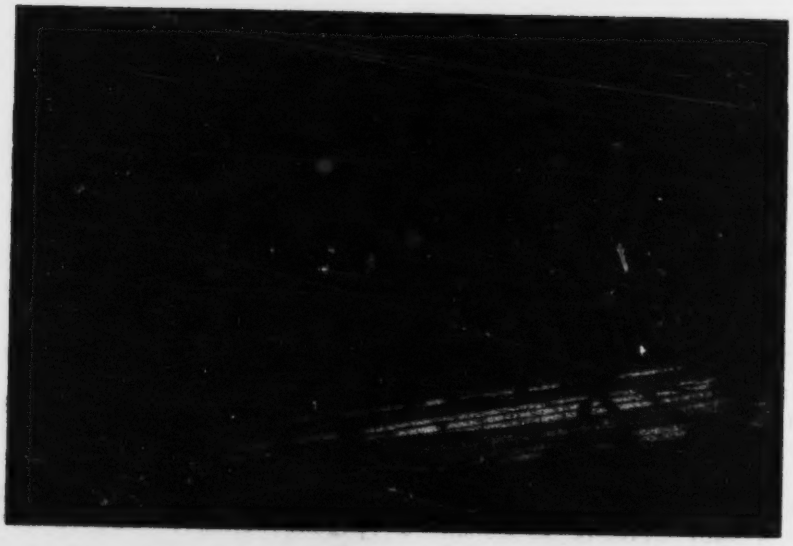
Water chemistry measurements for this coastal lake generally fall within the mid-range for the survey areas (Table 12). Notable exceptions were dissolved organic carbon, which was the lowest encountered at 65 µMole/L, and suspended carbon, which was high at 368 µg/L. Low secchi readings (2.5 m) suggest the presence of high levels of particulates in the water. This may account for high suspended carbon measurements. Chlorophyll A concentrations were low (0.55 µg/L) and zooplankton populations small, perhaps because the lake was still almost covered by ice. Phytoplankton and zooplankton do not likely account for high suspended carbon measurements. The reasons for low dissolved organic carbon measurements are unknown. *Limnocalanus macrurus*, and a variety of rotifers were the only zooplankton found in the lake (Table 11). Neither group was abundant.

While charr in the large inland lake (Fig. 7, loc. 3) resemble lake dwelling fish (loc. 1) in their low bone Sr levels and condition factors, this does not mean that anadromous charr do not enter the lake (Appendix II, Table 21; Appendix III, Table 23). The lake outlet seems passable to migrating charr.

Fish in both lakes were feeding on chironomid pupae, emerging trichopterans, hydracarina and detritus. Only 2 of 13 charr had empty stomachs. Six of 13 charr were parasitized by *Diphyllobothrium sp.* encysted in the gut walls. Male charr matured as early as age 12 years. The presence of ripe females in mid-August suggests that spawning occurs during September. Neither lake is a popular Inuit fishery probably because of very low catches per unit effort (eg. 8.9 kg/100 net m/24 h.).



Borden Plateau on Baffin Island is a rugged polar desert where glaciers and streams have carved channels into the sedimentary rock.



Fish drying at a sport-fishing camp located near the mouth of the Robertson River, on the shore of Koluctoo Bay, Milne Inlet. The camp is operated by the co-operative from Pond Inlet during August and September.

## 4. NORTHERN BAFFIN ISLAND

*General Description:*

The section of Baffin Island included in this study can be separated into the following physiographic regions: Lancaster Plateau, Boothia and Foxe Lowlands, Melville Upland, and Baffin Upland (Fig. 8, Blackadar 1970).

Lancaster Plateau covers most of Borden Peninsula, land south to the Jungerson River, and the northern three quarters of Brodeur Peninsula (Fig. 8). The plateau is comprised of sedimentary strata and rises gradually from south to north, reaching an elevation of about 400 m on Brodeur Peninsula and 700 m on Borden Peninsula. Lancaster Plateau is in a geologically youthful stage of development as the rivers and streams are actively incising channels and eroding headwards. On the Brodeur Peninsula only a few major rivers have incised channels inland and the plateau is topographically very uniform. The sheer 300 m cliffs along the north coast taper off towards the south of the peninsula as the plateau merges with Boothia Lowland. Borden Peninsula is topographically more varied, with deeply incised river valleys dividing the plateau into small blocks. Many of these rivers, such as the Robertson and Magda, have large flows and moderate gradients. South of Borden Peninsula, Lancaster Plateau gives way to Foxe Lowland, ending abruptly at an escarpment a few miles north of the Jungerson River.

Boothia Lowland stretches from southern Brodeur Peninsula to the Gulf of Boothia. The area is typified by numerous lakes with poorly developed drainage patterns. Foxe Lowland covers a strip of land stretching from the Jungerson River to Steensby Inlet. In the west its topography is gently undulating and lakes are few, but to the east the terrain becomes more rugged with numerous large lakes, such as Erichsen and Quartz, and a multitude of smaller ones. Boothia Lowland is underlain by sedimentary strata and Foxe Lowland by metamorphic rock, but the entire lowland region is covered by drift and there are few bedrock outcrops.

Melville Upland lies south of Foxe Lowland and covers a strip 80 km wide along Fury and Hecla Straits. This region is developed on both metamorphic and sedimentary rocks.

Baffin Upland lies to the east of Lancaster Plateau and Foxe Lowland and encompasses Bylot Island, Milne Inlet, the headwaters of the Ravn River, and the country east of Steensby Inlet. This physiographic feature dominates much of Baffin Island and is characterized by highly dissected terrain developed on crystalline rocks. Most of the rivers flowing down the uplands north slope are small and precipitous, but some large rivers such as the Rowley and Isortoq flow south-west to Steensby Inlet.

The Arctic Ocean influences Baffin Island weather only during open water and the winter climate is essentially continental. Fog is common along the coasts throughout summer and violent storms occur often during fall

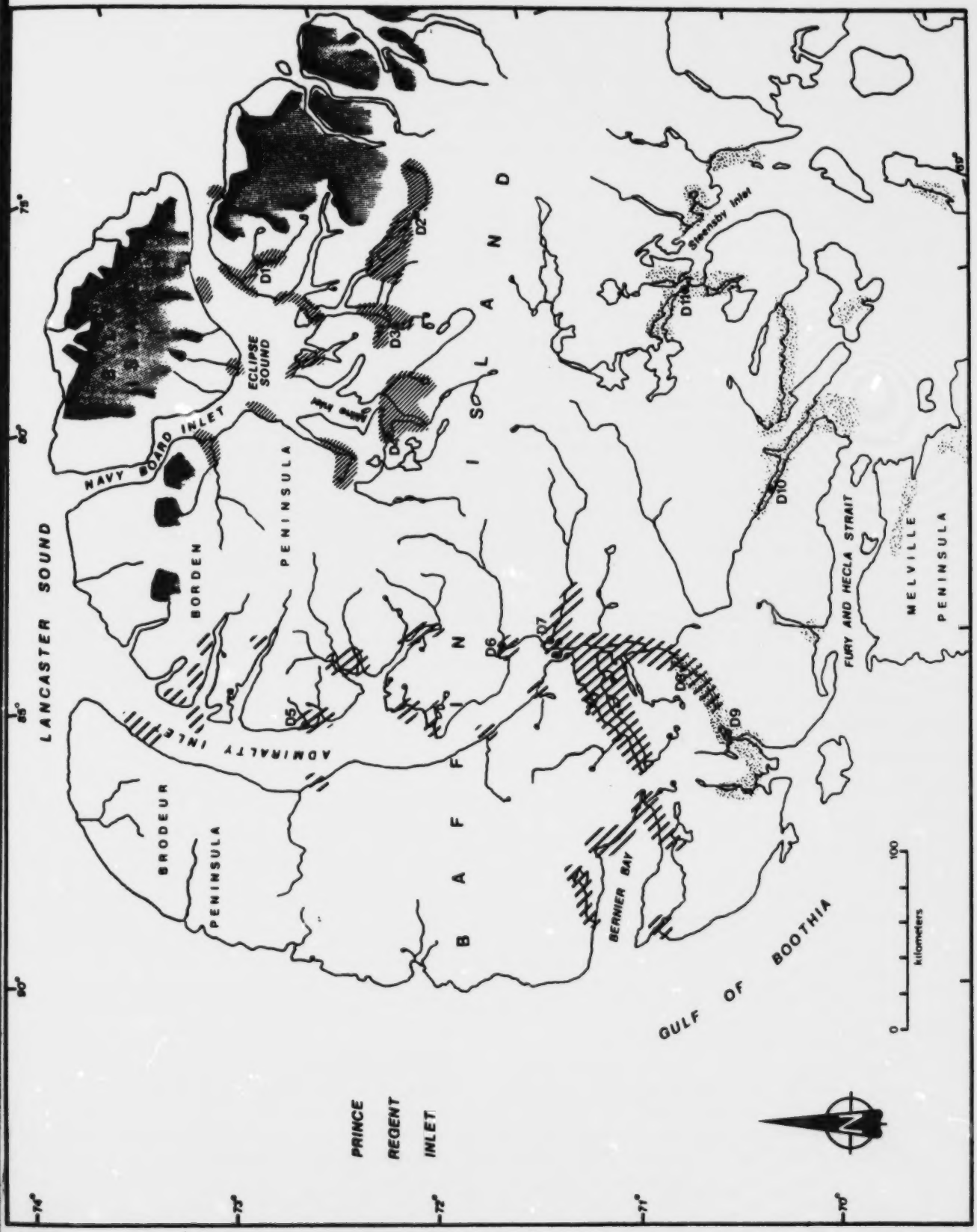



Figure 8. Areas of northern Baffin Island, N.W.T. visited by Arctic Bay ▨, Pond Inlet ▩, and Igloolik ▩ domestic fishermen.

(Blackadar 1970). Average annual precipitation is 150 mm, mean annual temperature is -14°C and prevailing winds are north-northwest at 13 knots (Koring 1977). Ice cover remains on lakes and rivers from October to June or July, although some deeper lakes may remain icebound year round.

The plant community of Lancaster Plateau is rock desert typified by sparse patches of lichen, avens, and saxifrages. The lowlands area to the south is a lush tundra community characterized by heaths, grasslands, and wetlands with tussocks of various grasses and sedges. Large areas of bare rock are found in northern Baffin Upland.

Two permanent settlements are located on northern Baffin Island; Arctic Bay, on the north shore of Adams Sound, and Pond Inlet, on the east shore of Eclipse Sound. The Hudson's Bay Company established a trading post at the present site of Arctic Bay in the 1920's, attracting to the area Inuit who were involved in trapping of fox and preparing furs. In 1979 the population of the community was 414, and the present economy is largely wage based, depending on employment provided by Panarctic Oils Limited and Nantsivik Mines. The Pond Inlet area was frequented by whalers and traders in the late 1800's, and in 1921 the Hudson's Bay Company established a post at the present town site. An RCMP post was established there a year later. The population of the hamlet was 620 in 1979, and the economy is still based mainly on hunting seal and whale, fishing, trapping, and carving.

The hamlet of Igloolik is located on Igloolik Island, south of N.W. Baffin Island and east of Melville Peninsula. The range of activity by this community includes much of the southern shore of north Baffin Island. In 1979 the population was 737 and although the community is situated in a rich marine harvesting area there is in progress a switch to a wage based economy (Kristofferson pers. comm., Koring 1977).

*Domestic, Commercial and Sport Fishing:*

The inland and coastal waters of northern Baffin Island are fished domestically (Fig. 8) and commercially (Fig. 9, Table 13) by residents of Pond Inlet, Arctic Bay, and Igloolik. Anadromous Arctic charr are the preferred food fish (Bissett 1967a, 1967b; Anders 1968; Brody 1976). They are gillnetted in the bays and sounds during July and August and at river mouths during June or August, when they are migrating to or from the ocean. Lakes where anadromous charr overwinter are fished through the ice during October and November and in April and May. The charr are attracted with shiny jigs to holes in the ice where they can be speared with leisters, or they are netted using short gillnets set beneath the ice. Smaller land-locked charr and lake trout *(Salvelinus namaycush)* are also prized food fish and they are often netted or jigged through the winter ice. Although Anders (1968) has reported lake trout in the Mary River system on Baffin Island, the only confirmed lake trout fishing occurs on the Melville Peninsula. There are very large lake trout in Hall Lake, south of Igloolik, which is a popular fishery. Most charr and trout fishing is conducted

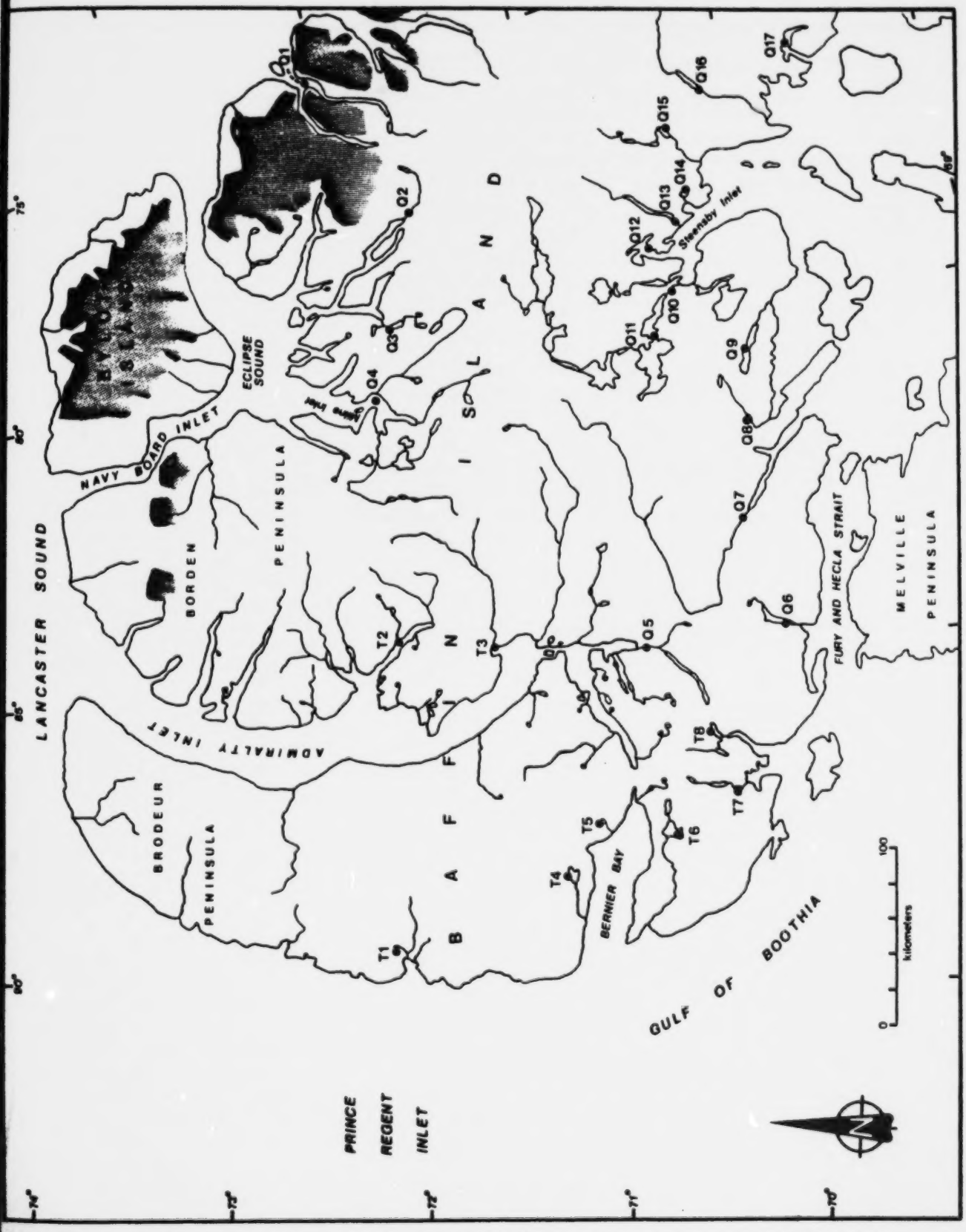



Figure 9. Commercial and test fishing quotas (Q) for the waters on and adjacent to northern Baffin Island, N.W.T. (Table 13).

Table 13. Baffin Island, N.W.T. commercial and test fishing quotas (Manual of Fisheries Acts and Regulations 1980, Kristofferson pers comm.)

| Site (Fig. 9) | Waters | Coordinates | Species | Quota (kg round wt) | Years Quota open for fishing |
|---|---|---|---|---|---|
| Q1 | Coutts Inlet Area | 72°04'N, 75°06'W | Ac (Searun) | 910 | 1975-78, 1979-81 |
| Q2 | Paquet Bay, River and Lake | 71°38'N, 77°20'W | Ac (Searun) | 2270 | 1976-81 |
| Q3 | Ikaliut River, Tay Sound | 71°58'N, 79°15'W | Ac (Searun) | 1360 | 1973-81 |
| Q4 | Tugat River | 72°03'N, 80°40'W | Ac (Searun) | 1360 | 1973-81 |
| Q5 | Saputing River | 70°47'N, 84°56'W | Ac (Searun) | 9080 | 1975-81 |
| Q6 | Whyte Lake and River | 70°10'N, 84°42'W | Ac (Searun) | 910 | 1975-80 |
| Q7 | Gifford River | 70°26'N, 83°40'W | Ac (Searun) | 2270 | 1975-81 |
| Q8 | Kukaluk River | 70°12'N, 81°55 W | Ac (Searun or Landlocked) | 3630 | 1973-81 |
| Q9 | Unnamed Lake | 70°11'N, 80°40'W | Ac (Landlocked)* | 4540 | 1975-81 |
| Q10 | Ravn River | 70°30'N, 79°50'W | Ac (Searun) | 9080 | 1975-81 |
| Q11 | Erichsen Lake, Ravn River | 70°40'N, 80°40'W | Ac (Landlocked)* | 9080 | 1975-78 |
| Q12 | Tarsuaq Arm River & Lake | 70°35'N, 78°55'W | Ac (Searun) | 1810 | 1975-81 |
| Q13 | Cockburn River | 70°27'N, 78°34'W | Ac (Searun) | 1140 | 1975-80 |
| Q14 | Unnamed River and Lake | 70°21'N, 78°24'W | Ac (Searun) | 1140 | 1975-80 |
| Q15 | Rowley River | 70°23'N, 77°12'W | Ac (Searun) | 4540 | 1975-78, 1980-81 |
| Q16 | Isortoq River and Lake | 70°07'N, 76°30'W | Ac (Searun) | 2270 | 1975-78 |
| Q17 | Eque Bay Area | 69°46'N, 76°08'W | Ac (Searun) | 910 | 1975-78 |
| | TEST QUOTAS | | | | TEST PERMITS |
| T1 | Fitzgerald Bay Area | 72°11'N, 89°40'W | Ac (Searun) | 2250 | Issued in 1979 |
| T2 | Ikpitikpiajuk Lake | 72°08'N, 84°17'W | Ac (Searun) | - | Tested in 1976 - Commercial fishing not recommended. |
| T3 | Magda River | 71°39'N, 84°38'W | Ac (Searun) | 1810 | Issued in 1979. |
| T4 | Ishuktok Lake | 71°20'N, 88°20'W | Ac (Searun) | 1360 | Issued in 1979. |
| T5 | Unnamed Lake | 71°12'N, 87°22'W | Ac (Landlocked or searun) | 680 | Issued in 1979. |
| T6 | Tashirq Kikiktalik Lake | 70°51'N, 87°43'W | Ac | 1360 | Issued in 1979. |
| T7 | Navarana Lake | 70°29'N, 87°08'W | Ac | - | Issued in 1978. |
| T8 | Ivisarak Lake | 70°34'N, 88°17'W | Ac (Searun) | 1360 | Tested in 1976 - Commercial fishing not recommended. |

* = 2½" Stretched mesh gillnets - all others 5½".

in conjunction with hunting and trapping expeditions. Fishermen fish specific freshwater lakes, known to have good fishing, but marine nets are set at any convenient point along the coastline (Brody 1976).

Arctic cod *(Boreogadus saida)*, sculpins, and Greenland shark *(Somniosus microcephalus)* are all fished occasionally (Mary-Rousselière 1959; Bissett 1967a, 1967b; Anders 1968; Brody 1976). Children amuse themselves by jigging for Arctic cod and sculpins through cracks in the sea ice. The fish they catch are sometimes used for supplementary dog food, but sculpins are never eaten by the Inuit and cod only in times of dire necessity. Greenland shark are commonly killed for sport or because they are damaging whale kills but their carcasses are seldom utilized except occasionally for dog food (Bruemmer 1969, Brody 1976, Reeves 1980). Before feeding shark meat to the dogs it must be detoxified by drying. Halibut are present in Eclipse Sound but the Inuit do not utilize them for food and were surprised to discover that they are eaten regularly by southerners (Bernier 1912).

Pond Inlet fishermen set coastal and river mouth nets throughout the Eclipse Sound area (Bissett 1967a, 1967b; Freeman 1976, Mary-Rousselière pers. comm.). Robertson River (Fig. 8, D4) and rivers at the heads of Tay Sound (D3) and Pacquet Bay (D2) have traditionally been good fishing sites for anadromous charr. Before Pond Inlet was established at its present location, enough fish were caught and cached at these sites during the full charr runs to support Inuit camps through the winter. The charr were speared at stone fish weirs (saputits) as they ran upstream but since the 1950's weirs have largely been abondoned in favor of the more efficient gillnets (Bissett 1967a). Close to the community, Utok Lake and the Salmon River (D1) provide a large portion of the domestic harvest which, in 1979, was estimated to be 2130 kg (Kristofferson unpubl. data).

During the 1978-79 commercial fishing season, an estimated 2570 kg of charr were caught by Pond Inlet fishermen (Kristofferson unpubl. data). No record is kept detailing where the fish were caught, but four areas near the community have been assigned commercial quotas (Fig. 9, Q1-4; Table 13). A charr quota on the Robertson River (4540 kg rnd) was rescinded in 1978, to protect a sport fishery at the river mouth operated by Pond Inlets' Toonoonik-Sahoonik Co-operative. The fishing camp operates during late August and early September and in 1979, one hundred and thirty seven anglers caught 762 anadromous Arctic charr (2,820 kg rnd; Enook pers. comm., Low pers. comm., Moshenko in prep.).

In 1958, the Pond Inlet RCMP detachment conducted a shark fishing experiment to determine the potential for shark fishing as a source of revenue and useful products for the local Inuit (Mary-Rousselière 1959, Bruemmer 1969, Reeves 1980). A single shark can yield over 100 L of high quality liver oil, which is a good lubricant and is also vitamin A rich. It's meat can be eaten by humans or dogs, after it has been detoxified, and shark skin makes good emery paper or durable leather. Greenlanders operate a profitable shark fishery. Although 7 sharks were caught in two weeks of fishing near the settlement, no Canadian fishery developed.

Demand for wage employees at Nanisivik Mine and the inaccessability of good fishing locations limit domestic fishing by Arctic Bay residents (Bissett 1967b). Coasts, lakes, and river mouths in southern Admiralty Inlet have been and remain the major fisheries, but their distance from Arctic Bay makes fishing expeditions infrequent (Fig. 8; Bissett 1967b, Fallis pers. comm., Freeman 1976). Saputing River has traditionally been an important fishery. Arctic charr were speared at saputits during upstream and downstream migrations and today the area is both commercially (Fig. 9, Q5; Table 13) and domestically fished (Fig. 8, D8). Ivisarak Lake (Fig. 8, D9) yields about 2000 kg of charr each spring and the Magda (D6) and Jungerson (D7) rivers are often fished during autumn caribou hunting (Kristofferson unpubl. data). Both Magda River (Fig. 9, T3) and Ivisarak Lake (T8) have been test fished to assess their commercial potential. They are capable of supporting a small commercial fishery but are currently domestically fished (Kristofferson unpubl. data). At the request of Arctic Bay residents, test quotas have been assigned to several other systems to assess their commercial potential (T1, 2, 4-7). The Eqalulik River near Arctic Bay (Fig. 9 D5), is fished during the spring seal hunt and during autumn. It's proximity to the community makes it accessible by boat whereas many of the fishing areas in southern Admiralty Inlet and Bernier Bay are only accessible by snowmobile. During the 1978-79 fishing season, the commercial charr catch was estimated at 3700 kg while the domestic catch was an estimated 1800 kg (Kristofferson unpubl. data).

Residents of Igloolik fish mainly along the south coast of northern Baffin Island. During the 1978-79 fishing season the Igloolik commercial fishery produced an estimated 12,300 kg of charr while the domestic catch was estimated at 5,700 kg (Kristofferson unpubl. data). Several rivers along Gifford Fiord (D10) and Steensby (D11) Inlet are popular domestic and commercial fisheries and the Saputing Lake (D8, 9) area is fished regularly (Figs. 8 and 9; Table 13; Anders 1968, Brody 1976, Freeman 1976).

*Previous Research:*

Research on the northern Baffin Island freshwater fish populations has been limited to synoptic test surveys and several short term experiments. Bernier (1912) fed the crew of the D.G.S. "Arctic" on Arctic charr obtained from Gifford (loc. 22) and Salmon (loc. 31) rivers; Saputing Lake (loc. 21); Nyeboe Fiord (loc. 19); and lakes at Kimatto Peninsula (loc. 18), Moffet Inlet (loc. 24), Levasseur Inlet (loc. 32) and south of Eclipse Sound (loc. 29, Fig. 10). Since 1973, the Fisheries Management Division of the Canadian Department of Fisheries and Oceans has been test fishing lakes and rivers to establish their commercial fishing potential. Representative samples of charr have been taken from Ivisarak (loc. 20), Saputing (loc. 21), and Ikaliut (loc. 30) lakes; the Magda (loc. 23), Tugat (loc. 28), Beta (loc. 26), Robertson (loc. 27) and Salmon (loc. 31) rivers; rivers in Moffet Inlet (loc. 25) and at the heads of Paquet Bay (loc. 33) and Coutts Inlet (loc. 34); and the lake at 71°12'N by 87°22'W (loc. 17; Peet 1975, 1976). A more detailed study of charr in the Robertson River system (loc. 27) is ongoing (Moshenko in prep., Low pers. comm.).

Figure 10. Locations on northern Baffin Island, N.W.T. sampled during the 1980 fish survey (1-16) or investigated during previous research (17-36).

Several studies were conducted in response to the development of a lead-zinc mine at Strathcona Sound and the effects of mine tailings on the environment. Most of the research dealt with marine organisms (Bohn and McElroy 1976, Bohn and Fallis 1978), but heavy metal concentrations in Arctic charr from Kuhulu Lake (loc. 35) were discussed by Bohn and Fallis (1978). The B.I.O.S. (Baffin Island Oil Spill) Project at Cape Hatt (loc. 30) is currently investigating the effects of an Arctic oil spill on the marine environment. Paul Idlout, a local fisherman, is monitoring the effects on anadromous charr (Sergy pers. comm.).

*Survey Results:*

Arctic charr and ninespine stickleback *(Pungitius pungitius)* were the only fish species caught in northern Baffin Island. Charr were caught at 11 sites in 6 drainage systems situated on Baffin Upland, Lancaster Plateau, and Foxe Lowland (Fig. 10). Most of the populations were strictly lake dwelling and several had bimodal length-frequency distributions (Fig. 11). Anadromous charr and ninespine stickleback were caught only in the Robertson River system (Fig. 10; Loc. 11, 14).

The headwaters of both the Ikaliut and Tugat rivers, which drain into Tay Sound and Milne Inlet respectively, are situated on a plateau of Baffin Upland. Icebound Lake (Fig. 10, loc. 1), on the Tugat River system, and the uppermost Ikaliut Lake (loc. 2) lie in rolling hills atop the plateau. The downstream Ikaliut lakes (loc. 3, 7) are located at the edge of the plateau, surrounded by steep cliffs. All of the lake basins are elevated over 600 m above sealevel. Their bare, aften broken, rock base is covered by sparse and patchy shoreline vegetation. The Ikaliut lakes are isolated from the rest of the system by sheer cliffs that prevent upstream charr migrations. Further rises in elevation block upstream migrations between the lakes. Steep gradients on the Tugat River system probably prevent anadromous charr from entering Icebound Lake.

When the Ikaliut lakes and Icebound Lake were sampled, August 20-23, only the uppermost Ilaliut lake (Fig. 10, loc. 2) was ice free. Small, exposed, and shallow, it did not yield fish. Only two slow-growing cannibalistic charr were caught in the deep (>50 m) lake immediately downstream (loc. 3). Its steep bottom contours and extensive ice cover prevented efficient gillnetting. Fish moving downstream out of this lake isolate themselves in a small ($0.1 km^2$), cold ($3.3^{\circ}C$), deep lake (loc. 7). It had clear water with low ion concentrations and specific conductivity (Table 17). Suspended nutrient concentrations were generally low but chlorophyll A concentrations were high and rotifers were relatively abundant (Tables 16, 17). Crustacean zooplankton in the lake, *Cyclops scutifer* and a diaptomid species, were scarce. There were two discreet age-length groups of charr in the lake, one composed of small young fish (103-130 mm, 5-9 y), and the other of larger old fish (415-490 mm, 23-32 y; Appendix II, Table 22). Charr in both groups were preparing to spawn in August but neither the small nor the large fish were in good condition (0.809; Tables 14, 15). Few of the large fish had fed and all were infected by

Table 14. Summary of age, length, and weight data for Baffin Island Arctic charr.

| Sampling Location | | | Length (mm) | | Weight (g) | | Condition Factor | | Length-Weight Relationship** | | | | Age (y) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site # | Coordinates | N | Mean (Range) | S.D. | Mean (Range) | S.D. | Mean | S.D. | y intercept (log a) | slope (b) | S.D. of b | $r^2$ | n | Mean (Range) | S.D. |
| 1 | 71°42.5'N 79°27'W | 30 | 423 (104-660) | 155 | 975 (9-3250) | 932 | 0.860 | 0.135 | -5.532 | 3.178 | 0.062 | 0.990 | 29 | 21.5 (7-33) | 7.8 |
| 3 | 71°47'N, 79°25'W | 2 | 395 (375-415) | 28 | 470 (440-500) | 42 | | | | | | | 1 | 22 | |
| 4 | 70°52'N, 79°36'W | 53 | 368 (109-621) | 120 | 617 (10-2800) | 542 | 0.911 | 0.165 | -5.475 | 3.168 | 0.077 | 0.971 | 52 | 17.3 (6-30) | 6.3 |
| 5 | 71°10.5'N, 79°21'W | 24 | 209 (101-400) | 120 | 160 (7.5-560) | 200 | 0.788 | 0.094 | -5.411 | 3.135 | 0.034 | 0.998 | 16 | 10.8 (4-21) | 5.7 |
| 6 | 71°14'N, 79°09'W | 6 | 329 (107-574) | 186 | 664 (9.5-2050) | 769 | 0.809 | 0.138 | -5.584 | 3.226 | 0.059 | 0.999 | 6 | 17.0 (4-29) | 11.3 |
| 7 | 71°48'N, 79°22.5'W | 26 | 214 (100-490) | 158 | 237 (8-1200) | 368 | 0.809 | 0.138 | -5.128 | 3.013 | 0.056 | 0.992 | 20 | 14.2 (5-32) | 10.8 |
| 8 | 70°44.5'N, 80°38'W | 132 | 229 ( 88-583) | 144 | 244 (7-1960) | 336 | 0.916 | 0.105 | -4.918 | 2.946 | 0.015 | 0.996 | 104 | 12.5 (5-31) | 7.2 |
| 9 | 71°21'N, 84°37'W | 46 | 268 ( 96-543) | 132 | 293 (7.5-1535) | 349 | 0.840 | 0.072 | -5.245 | 3.071 | 0.020 | 0.998 | 46 | 13.1 (4-28) | 6.6 |
| 10 | 72°00'N, 84°26'W | 28 | 203 (99-454) | 83 | 116 (6-850) | 184 | 0.809 | 0.146 | -5.900 | 3.351 | 0.102 | 0.976 | 24 | 10.8 (4-18) | 3.7 |
| 11 | 71°58'N, 81°18'W | 3 | 626 (462-785) | 162 | 2350 (800-3550) | 1408 | 0.872 | 0.176 | -4.750 | 2.887 | 0.723 | 0.941 | 3 | 21.0 | |
| 14 | 71°58'N, 82°07'W | 2 | 403 (196-610) | 293 | 1252 (55-2450) | 1694 | 0.905 | 0.247 | | | | | 2 | 16.5 (11-22) | 7.8 |

* Condition Factor = weight in g·(fork length in mm)$^{-3}$·$10^5$

**log weight in g = b·log length in mm + log a

Table 15. Summary of sexual maturity data for Baffin Island Arctic charr.

| Sampling Site # | Sampling Date | N | Sex | Maturity: Immature | Mature | Near Ripe | Ripe | Ripe & Running | Spent | Unknown | Age of Youngest mature fish (y) | Length of Youngest mature fish (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 19-20/8/80 | 20 | male | 7 | 6 | | 2 | 5 | | | | |
| | | 10 | female | 2 | 8 | | | | | | 12 | 475 |
| | | 30 | total | 9 | 14 | | 2 | 5 | | | 14 | 281 |
| 3 | 19-20/8/80 | | male | | | | | | | | | |
| | | 2 | female | | 2 | | | | | | | |
| | | 2 | total | | 2 | | | | | | 22 | 415 |
| 4 | 20-21/8/80 | 32 | male | 2 | 29 | 1 | | | | | | |
| | | 21 | female | 9 | 10 | 2 | | | | | 10 | 234 |
| | | 53 | total | 11 | 39 | 3 | | | | | 14 | 309 |
| 5 | 21-23/8/80 | 10 | male | 5 | 4 | | 1 | | | | | |
| | | 9 | female | 4 | 4 | 1 | | | | | 12 | 342 |
| | | 19 | total | 9 | 8 | 1 | 1 | | | | 11 | 307 |
| 6 | 21-23/8/80 | 5 | male | 1 | 2 | | 1 | 1 | | | | |
| | | 1 | female | 1 | | | | | | | 11 | 304 |
| | | 6 | total | 2 | 2 | | 1 | 1 | | | | |
| 7 | 21-23/8/80 | 10 | male | 2 | 3 | | 4 | 1 | | | | |
| | | 7 | female | 1 | 3 | 2 | 1 | | | | 5 | 114 |
| | | 17 | total | 3 | 6 | 2 | 5 | 1 | | | 5 | 108 |
| 8 | 23-26/8/80 | 78 | male | 4 | 34 | 36 | 1 | 3 | | | | |
| | | 38 | female | 7 | 24 | 3 | 4 | | | | 5 | 88 |
| | | 119 | total | 11 | 58 | 39 | 5 | 3 | | 3 | 5 | 101 |
| 9 | 26-27/8/80 | 30 | male | 11 | 14 | 1 | 1 | 3 | | | | |
| | | 16 | female | 7 | 4 | 1 | 4 | | | | 10 | 260 |
| | | 46 | total | 18 | 18 | 2 | 5 | 3 | | | 7 | 130 |
| 10 | 27-28/8/80 | 16 | male | 1 | 3 | | 3 | 9 | | | | |
| | | 5 | female | | 2 | | 1 | 2 | | | 8 | 182 |
| | | 21 | total | 1 | 5 | | 4 | 11 | | | 11 | 195 |
| 11 | 27-28/8/80 | 1 | male | | 1 | | | | | | | |
| | | 2 | female | | 1 | | 1 | | | | 21 | 462 |
| | | 3 | total | | 2 | | 1 | | | | 21 | 632 |
| 14 | 27-28/8/80 | 1 | male | 1 | | | | | | | | |
| | | 1 | female | | | | 1 | | | | 22 | 610 |
| | | 2 | total | 1 | | | 1 | | | | | |

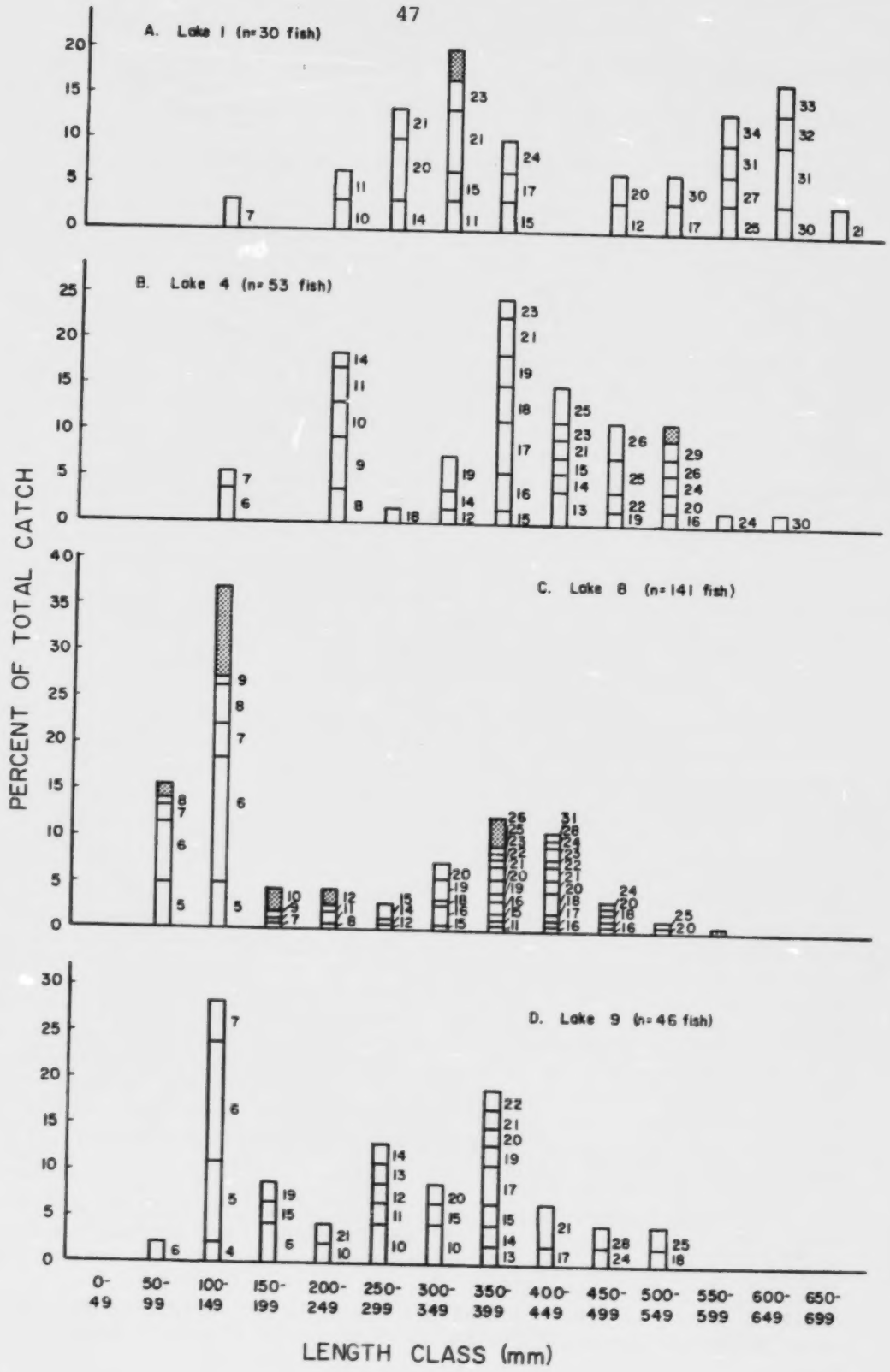



Figure 11. Age-frequency distribution by length class in the catches of Arctic charr, *Salvelinus alpinus*, from lakes 1 (71°42.5'N, 79°27'W), 4 (70°52'N, 79°36'W), 8 (70°44.5'N, 80°38'W), and 9 (71°21'N, 84°37'W) on northern Baffin Island, N.W.T. (Fig. 10; Tables 14, 15, 22).

*Diphyllobothrium sp.* Fish of both sexes were mature by age 5 years.

Charr in Icebound Lake showed a bimodal or perhaps trimodal length-frequency distribution (Fig. 11A). Ages varied widely within each length class although many of the large fish were very old. A high proportion of the population was large so the weight of fish caught per unit effort was great relative to other Baffin Island populations (30.0 kg/100 net m/24 h). There were mature charr in both the large and small length groups and large males were in spawning condition (Table 15, loc. 1). The youngest mature fish in the population were over twice the age of those in the nearby Ikaliut Lake (loc. 7). Small charr in Icebound Lake were generally in poorer condition ($\bar{x}$ = 0.789, SD = 0.069) than the large charr ($\bar{x}$ = 0.975, SD = 0.111); most fish had heavy *Diphyllobothrium sp.* encystations in their gut walls. Chironomid larvae and pupae were the main food items but larval trichopterans and charr were also eaten. Over half the fish had fed when they were caught.

The Robertson River system drains Lancaster Plateau into Koluktoo Bay, on the west side of Milne Inlet (Fig. 10, loc. 10-14). Although the surrounding terrain is rugged, the river gradient is moderate and erosion of the sedimentary rock has created numerous beaches and shoals. Patches of low vegetation grow in sheltered areas along the shoreline.

Ninespine stickleback and anadromous and lake-dwelling charr inhabit the Robertson River system. Sampling on the 27th and 28th of August produced small, old fish in generally poor condition from three lakes on the system (Fig. 10; loc. 10, 11, 14). In the largest lake (loc. 10), 15 fish varying in age from 8-13 y and in length from 180-227 mm were in spawning condition. Several of the larger lake dwelling fish were infected by *Diphyllobothrium sp.* Charr fry and parr and a single ninespine stickleback were caught in a small stream (loc. 12) that flows into the lake. Large anadromous charr were not caught in this lake but were present in an adjacent lake connected by a wide deep channel (loc. 11). One of the large anadromous charr was still silver, having just come from the sea, while another was orange. The silver charr was a mature female in good condition (1.070; 632 mm, 2700 g), while the orange charr was a ripe female in poor condition (0.734; 785 mm, 3550 g). Both of them were 21 years old and much larger than a lake dwelling male the same age (462 mm, 800 g). Another large ripe female (610 mm, 2450 g, 22 y) was caught in the Robertson River system (loc. 14). It was orange and in good condition. None of the large anadromous charr were visibly infected by *Diphyllobothrium sp.* although several lake dwelling canniballistic charr had cysts in their gut walls.

The largest lakes in northern Baffin Island are located on Foxe Lowland (Fig. 10). Angajarjualuk (loc. 5) and Erichsen (loc. 8) lakes on the Ravn River, Nina Bang Lake (loc. 4) on the Harder River, and an unnamed lake (loc. 9) on the Jungerson River all contain thriving populations of lake dwelling charr. The Ravn and Harder Rivers drain southwards into Steensby Inlet while the Jungerson drains northwards into Admiralty Inlet.

Table 16. Zooplankton species and their abundance (mean number of individuals per litre) in three lakes on Baffin Island.

| Sampling Site (Fig. 10) | 4 | 7 | 8 |
|---|---|---|---|
| Date | 20/8/80 | 22/8/80 | 26/8/80 |
| Depth (m) | 9.5 | 4.5 | 7.0 |
| Number of Samples | 4 | 4 | 5 |
| Ph. Arthropoda | | | |
| Cl. Crustacea | | | |
| SCl. Copepoda | | | |
| O. Calanoida | | | |
| *Diaptomus minutus* | 0.18 | | 1.87 |
| Diaptomidae nauplii | 0.46 | 0.02 | 1.94 |
| O. Cyclopoida | | | |
| *Cyclops scutifer* | 2.22 | 0.20 | 2.40 |
| *Cyclops magnus* | <0.01 | | |
| Cyclopidae copepodids | 2.96 | | 13.25 |
| Cyclopidae nauplii | 5.94 | 0.06 | 2.71 |
| O. Harpacticoida | | | 0.02 |
| SCl. Branchiopoda | | | |
| O. Diplostraca | | | |
| SO. Cladocera | | | |
| *Bosmina longirostris* | | | 0.06 |
| *Chydorus sphaericus* | <0.01 | | 0.02 |
| *Daphnia longiremis* | 0.11 | | 2.41 |
| *Holopedium gibberum* | | | 0.02 |
| Total ind/L | 11.87 | 0.28 | 24.70 |
| Number of Species | 5 | 2 | 7 |
| Ph. Rotifera | 9.67 | 64.27 | 80.19 |

Table 17. Water chemistry data (means of n samples) for three Baffin Island Lakes.

| Sampling Site (Fig. 10) | 4 | 7 | 8 |
|---|---|---|---|
| Coordinates | 70°52'N, 79°36'W | 71°48'N, 79°22.5'W | 70°44.5'N, 80°38'W |
| Date | 21/8/80 | 23/8/80 | 26/8/80 |
| Field Data | | | |
| Surface water temperature (°C) | 6.4 | 3.3 | 7.2 |
| Depth (m) | 9.5 | 9.0 | 13.0 |
| Time of day (h) | 1500 | 1130 | 2000 |
| Light Conditions | thin cloud | light fog | broken cloud |
| Secchi depth (m) | 9.5 | 8.5 | 5 |
| Secchi color | deep forest green | blue green | deep green |
| Laboratory Data | | | |
| Number of samples (n) | 4 | 4 | 4 |
| pH | 7.18 | 6.66 | 6.95 |
| Conductivity at 25°C (µS/cm) | 50 | 20 | 50 |
| Total dissolved nitrogen (µg/L) | 102 | 90 | 155 |
| Total dissolved phosphorus (µg/L) | 8 | 4 | 4 |
| Dissolved organic carbon (µMole/L) | 140 | 72 | 335 |
| Nutrients (µg/L) | | | |
| Suspended nitrogen | 36 | 37 | 66 |
| Suspended phosphorus | 2.0 | 1.8 | 3.0 |
| Suspended carbon | 230 | 132 | 318 |
| Chlorophyll A | 0.42 | 0.80 | 1.22 |
| Major Ions (mg/L) | | | |
| Sodium | 1.90 | 1.77 | 1.97 |
| Potassium | 0.28 | 0.08 | 0.16 |
| Calcium | 5.06 | 1.68 | 4.73 |
| Magnesium | 2.39 | 0.94 | 2.82 |
| Chloride | 1.0 | 0.4 | 1.0 |
| Sulphate | 0.4 | 0.2 | 0.6 |
| Heavy Metals (µg/L) | | | |
| Strontium | 6.0 | | 3.8 |

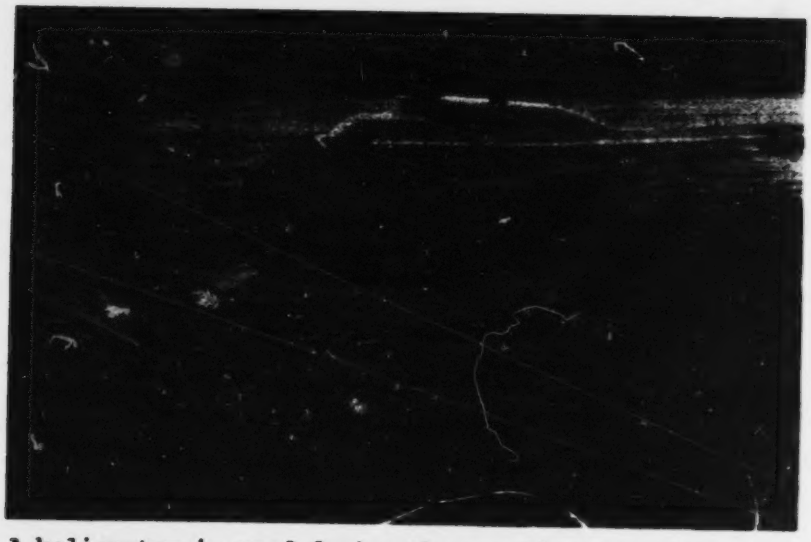
The Ravn River system was sampled at four sites between the 21st and 26th of August. Fish catches per unit effort were low throughout the river system both in terms of the number and weight of fish caught (<20.6 fish/100 net m/24 h, <5.0 kg/100 net m/24 h). Charr were caught in a small headwater lake (Fig. 10, loc. 6) but not in a shallow nearby stream (loc. 16). The lake was situated in low rolling hills and had a sandy bottom and shores carpeted by tundra vegetation. A wide size and age range of charr inhabited the lake (Table 15). They were feeding on chironomids but were only in fair physical condition (0.809). Most fish were parasitized by *Diphyllobthrium sp.* Immediately downstream in similar surroundings, Angajurjualuk Lake (loc. 5) supports a population of charr with high (>198 µg/g) bone Sr levels (Appendix III, Table 23). The fish were small, slow growing, and in poor condition (0.788). A high freshwater Sr level and not anadromy probably accounted for their high bone Sr concentrations (Table 15). Like charr in Erichsen Lake, they were feeding mainly on chironomid larvae and pupae and less often on larval trichopterans in stone cases.

Erichsen Lake (loc. 8), the largest lake in the Ravn River system, is situated downstream from Angajurjualuk Lake only 35 km from Steensby Inlet (Fig. 10). It has shores of bare rock and sand with less shoreline vegetation than the other Foxe Lowland lakes. Conductivity, and ion concentrations were low, perhaps because the main lowland rock formations are igneous and not readily soluble (Table 17). Suspended nutrient and chlorophyll A concentrations were high, and rotifers and crustacean zooplankton were abundant-relative to the other natural Arctic lakes sampled (Tables 16, 17). Seven species of crustacean zooplankton were caught in the lake. Although anadromous charr inhabit the Raven River below Erichsen Lake, none of the fish caught appeared to be anadromous. Charr caught (n=141) were slow growing, many (n=45) were heavily parasitized, and the few fish measured (n=5) had the low bone Sr levels associated with lake dwelling fish (Gaboury 1980; Table 14; Appendix III, Table 23). A length-frequency distribution for the charr population was bimodal and the ages of fish in each length class varied widely (Fig. 11C). Fish of both sexes matured by age 5 y and there were ripe fish in each of the modal size groups (Table 15). Spawning throughout the Ravn River system appeared to occur during late August and early September. The sex ratio favored males by almost 2:1 and the number of mature non-spawning fish suggests that individual charr do not spawn annually. Charr in Erichsen Lake were generally in better condition (0.917) than those in Angajarualuk and Nina Bang Lakes (Table 14). Ten of 141 charr in the lake were cannibals.

Nina Bang Lake lies on Foxe Lowland 40 km north of Steensby Inlet (Fig. 10, loc. 4). Its shores and bottom are sandy and the rolling hills surrounding it are carpeted by low tundra vegetation. There are no large streams flowing into or out of Nina Bang Lake. Water in the lake was clearer than that in nearby Erichsen Lake with similar conductivity and major ion concentrations (Table 17). Dissolved and particulate carbon, nitrogen and phosphorus and chlorophyll A were slightly lower than in Erichsen Lake and rotifers and crustacean zooplankton were less abundant (Tables 16, 17). Five zooplankton species were caught in Nina Bang Lake. Charr in the lake grew slowly to a large maximum size and were probably strictly lake dwelling (Fig. 11B, Table 14). Strontium concentrations in the bones of 7 large fish were low (<55 µg/g; Appendix III, Table 23). The apparent good condition

(0.911) of fish in the lake is deceptive since the gut walls were commonly swollen almost 2 cm thick by layers of encysted *Diphyllobothrium sp.* Muscle in many of the fish was flaccid. The youngest mature charr were 10 and 14 y old for males and females respectively, and only 3 of 42 mature fish were preparing to spawn (Table 15). The weight and number of fish caught per unit effort (24.0 fish/100 net m/24 h), 14.9 kg/100 net/24 h) resembled that for Erichsen Lake, as did sex ratios where males outnumbered females.

The unnamed lake at the edge of Foxe Lowland lies on the 'flood plain' of the Jungerson River (Fig. 10, loc. 9). It is close to Admiralty Inlet on a tundra covered lowland that is interrupted by rock outcrops. Outlet streams to the river and inlet are shallow and boggy, probably allowing fish passage only during high runoff years. Charr in the lake appeared to be strictly lake dwelling with the exception of one individual with a high concentration of strontium in its bones (344 µg/g; Appendix III, Table 23). All fish caught in the lake grew slowly and were generally in fair condition (0.839; Table 14, Fig. 11D). Possibly the fish with a high bone Sr went to sea for a short time when it was small. The length-frequency distribution for charr in the lake closely resembles that for Erichsen Lake (Fig. 11C, D). Fish were abundant relative to other Baffin Island populations (69.1 fish/100 net m/24 h cf.<55.0 fish/100 net m/24 h). Spawning began during the last week of August. Then the charr were feeding on chironomid and trichoptera larvae and few had *Diphyllobothrium sp.* encysted in their gut walls.



A helicopter is used during the sampling procedure to set and retrieve nets.

A fisheries biologist retrieving nets from a shallow lake.

## 5. SUMMARY

Arctic charr *(Salvelinus alpinus)* and ninespine stickleback *(Pungitius pungitius)* were the only fish species caught in lakes sampled on Devon (n=18 lakes), Cornwallis (n=5), Somerset (n=3), and northern Baffin (n=16) islands. Ninespine stickleback were caught only in the Robertson River system on northern Baffin Island. On all the islands, lakes that did not winterkill contained charr. Meretta Lake, the Resolute airbase sewage lagoon, was an exception. Coastal lakes with outlet streams passable to fish immigration usually contained both anadromous and strictly lake dwelling charr. Lake dwelling fish were older, grew more slowly, and had lower concentrations of strontium in their bones than anadromous charr. They were commonly poorer condition and subject to heavy *Dephyllobothrium sp.* encystations, particularly charr in the large Baffin Island lakes. Age at maturity and growth rate varied widely within and between charr populations; dwarf charr were common. Some isolated populations began spawning in mid-August but populations elsewhere began in late August. Less than 50% of the mature charr were preparing to spawn. Chironomid pupae and larvae were the most important fish foods during August. Larval, pupal and adult trichopterans; charr; hydracarina; plant material; and detritus were also eaten.

Lakes with shoreline vegetation had the highest chlorophyll A and dissolved and particulate carbon, nitrogen and phosphorus concentrations; major ion concentrations were highest in lakes on sedimentary strata. Sewage inputs have made Meretta Lake eutrophic. Dissolved and particulate C-N-P and chlorphyll A content of the lake was much higher than in other polar desert lakes.

Crustacean zooplankton and rotifers were most abundant in lakes with shoreline vegetation. A total of 10 crustacean species were found: 2 calanoids, 3 cyclopoids, 4 cladocerans and 1 harpacticoid. Lakes on Baffin Island were the richest in species with *Diaptomus minutus, Cyclops scutifer, C. magnus, Daphnia longiremis, Bosmina longirostris, Chydorus sphaericus, Holopedium gibberum,* and an unidentified harpacticoid. Baffin Island lakes also had the most abundant plankton, up to 24.7 individuals/L. *Cyclops vicinus, Limnocalanus macrurus, Daphnia longiremis, Bosmina longirostris, Chydorus sphaericus,* and an unidentified harpacticoid were found in Devon Island lakes. *Cyclops vicinus* has not been recorded elsewhere in Canada. Lakes on Cornwallis and Somerset islands were poorest in species and numbers of crustacean zooplankton with only *Limnocalanus macrurus* and/or *Cyclops scutifer* present. Meretta Lake had a strikingly high abundance of rotifers *(Keratella sp., Polyarthra sp.)* but only a single crustacean species, *Cyclops scutifer.*

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# APPENDIX I

## Distributions of Marine Fish Species

Little information is available on the distribution and biology of marine fish species occurring in the survey area, and often that information remains unpublished. Dr. D.E. McAllister, Curator of Fishes at the National Museum of Natural Sciences in Ottawa, has prepared a Bibliography of the Marine Fishes of Arctic Canada, 1771-1979 (Robinson and McAllister 1980) and, together with Dr. J.G. Hunter, is preparing a book on Marine Fishes of Arctic Canada. He kindly supplied the authors with a pre-publication copy of his bibliography, and with information on specimens housed in the museum's collection, many of which were collected by Dr. Hunter. A list of marine species in the survey area, together with approximate catch locations (Fig. 12) and references, has been included in Table 18. The expense and logistical difficulties connected with deep sea and/or long term sampling in the high Arctic have limited studies to comparatively shallow, short term test fishing. Only in Strathcona Sound (Fig. 10, loc. 5), Creswell Bay (Fig. 7, loc. 9) and Resolute Bay (Fig. 4, loc. 15) has there been concerted sampling. It is likely that further sampling will discover other species in the area.

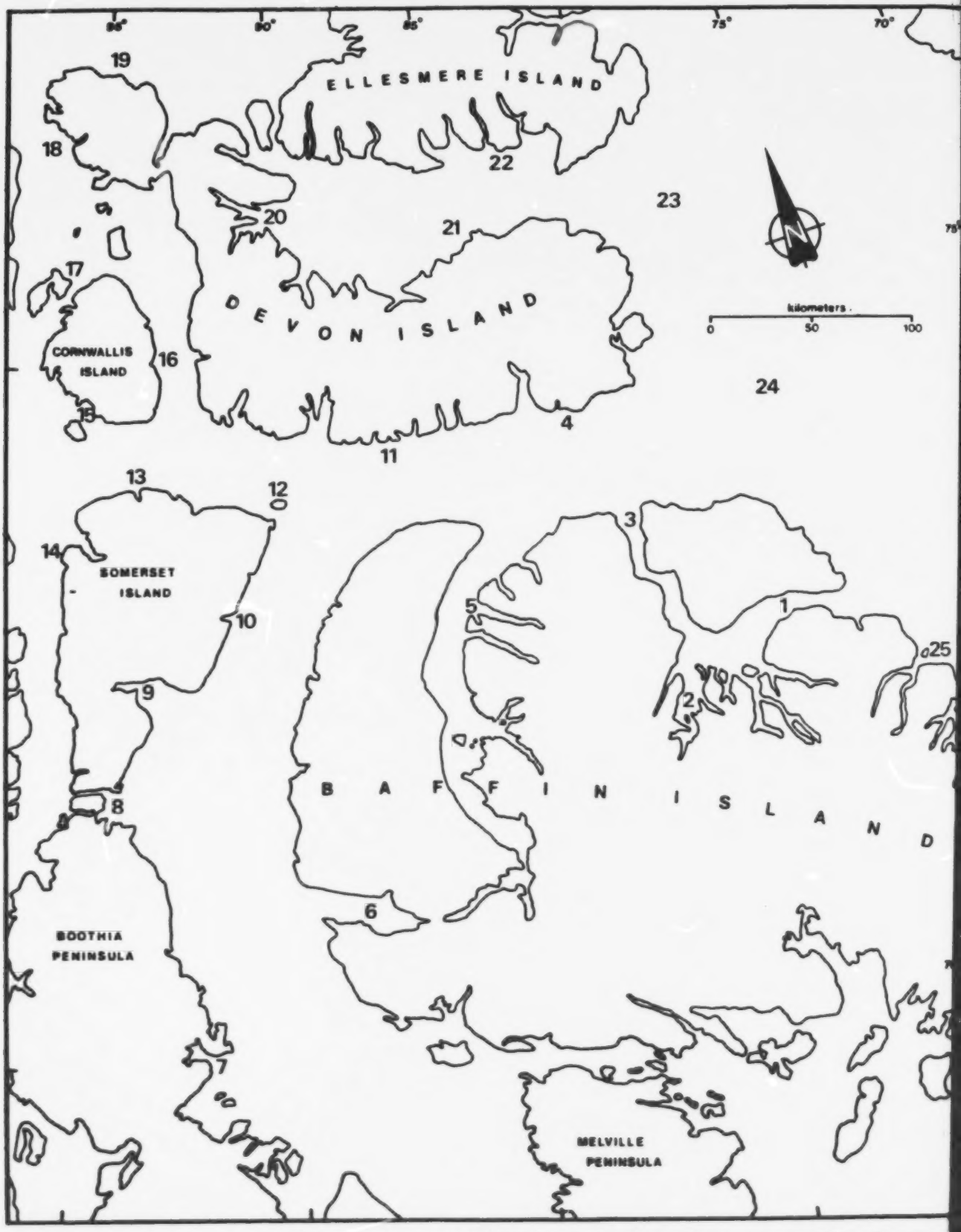


Figure 12. Map of marine fish species catch locations in the waters surrounding Devon, Cornwallis, Somerset, Bylot, and northern Baffin islands and Boothia Peninsula, N.W.T. (Table 18).

Table 18. Distribution records of marine fish species caught in the survey area.

| Species Name | | |
|---|---|---|
| Scientific | Common | Catch Location (Fig. 12) and Reference |
| F. Dalatiidae | | |
| *Somniosus microcephalus* (Bloch and Schneider 1801) | Greenland Shark | 5 (B.C. Research 1975); 2 (Beck and Mansfield 1969): 5 (Bissett 1967b); 2 (Brunmer 1969); 1, 2 (Mary-Rousselière 1959); 5 (Reeves 1980); 1, 15 (Templeman 1963). |
| F. Rajidae | | |
| *Raja hyperborea* Collett 1879 | darkbelly skate | 2 (Beck and Mansfield 1969). |
| F. Salmonidae | | |
| *Coregonus artedii* Le Sueur 1818 | lake cisco | 6 (Ellice 1962). |
| F. Gadidae | | |
| *Arctogadus glacialis* (Peters 1874) | polar cod | 1 (Bissett 1967b); 3, 9 (McAllister pers. comm.); 3, (Thomson etal. 1979). |
| *Boreogadus saida* (Lepechin 1774) | Arctic cod | 8, 14, 15, 17 (Bain and Sekerak 1978); 15, 16 (Bain et al. 1977); 3, (Bohn and McElroy 1976); 16 (Bradstreet 1975); 5 (Dunbar 1947); 1 (Ellis 1962); 22 (Freeman 1968); 15 (Green and Steele 1975); 15 (Holeton 1974); 5, 9, 15, 18 (McAllister pers. comm.); 12 (Nettleship 1976); 7, 10 (Ross 1835); 1, 3, 4, 23, 24 (Sekerak et al 1979); 3, 4, 11 (Sekerak et al. 1976a); 9 (Sekerak et al. 1976b); 4 (Thomson et al. 1979); |
| *Gadus ogac* (Richardson 1836) | Greenland cod | 10 (Boulva 1972). |
| F. Macrouridae | | |
| *Corphaenoides rupestris* Gunnerus 1765 | rock grenadier | 1 (Ellis 1962). |
| F. Zoarcidae | | |
| *Gymnelis retrodorsalis* Le Danois 1913 | aurora unernak | 5 (McAllister pres. comm.) |
| *Gymnelis viridis* (Fabricius 1780) | fish doctor | 1 (Ellis 1962); 15 (Green and Steele 1975); 15 (Holeton 1974); 5, 9, 15, 17, 18 (McAllister pers. comm.); 4 (Sekerak et al. 1967a); 1, 4 (Thomson et al. 1979). |
| *Lycodes mucosus* Richardson 1855 | saddled eelpout | 15 (Green and Steele 1975); 15, 17 (McAllister pers. comm.); 13 (Sekerak et al. 1976a); 1 (Thomson et al. 1979). |
| *Lycodes pallidus* Collett 1878 | pale eelpout | 5, 9 (McAllister pers. comm.). |
| *Lycodes polaris* (Sabine 1824) | Canadien eelpout | 15 (Green and Steele 1975); 5, 9, 15 (McAllister pers. comm.). |
| *Lycodes reticulatus* Reinhardt 1838 | Arctic eelpout | 5 (McAllister pers. comm.). |
| *Lycodes seminudus* Reinhardt 1837 | longear eelpout | 23 (McAllister pers. comm.). |
| *Lycodes turneri* Bean 1878 | polar eelpout | 15 (Holeton 1974); 4 (Sekerak et al. 1976a). |
| *Lycodes sp.* | eelpout | 1 (Ellis 1962); 4 (Thomson et al. 1979). |
| F. Lumpenidae | | |
| *Leptoclinus maculatus* (Fries 1837) | daubed shanny | 5 (McAllister pers. comm.). |
| F. Ammodytidae | | |
| *Ammodytes sp.* | sand lance | 2 (Low pers. comm.). |
| F. Cottidae | | |
| *Artediellus scaber* Knipowitsch 1907 | rough hookear | 9 (McAllister pers. comm.). |
| *Artediellus uncinatus* (Reinhardt 1835) | Arctic hookear sculpin | 15 (Holeton 1974). |
| *Gymnocanthus tricuspis* (Reinhardt 1832) | Arctic staghorn sculpin | 15 (Green and Steele 1975); 15 (Holeton 1974); 5, 9, 15 (McAllister pers. comm.); 9 (Sekerak et al. 1976b); 1, 25 (Thomson et al.1979). |
| *Icelus bicornis* Reinhardt 1841 | twohorn sculpin | 15 (Green and Steele 1975); 15 (Holeton 1974); 5, 9, 15 (McAllister pers. comm.). |
| *Icelus spatula* Gilbert and Burke 1912 | Spatulate sculpin | 15 (Green and Steele 1975); 15 (Holeton 1974); 5, 9, 15 (McAllister pers. comm.); 1, 4 (Thomson et al. 1979). |
| *Myoxocephalus quadricornis* (Linnaeus 1758) | fourhorn sculpin | 5 (B.C. Research 1975); 1 (Ellis 1962); 15 (Green and Steele 1975); 1 (Johansen 1925); 1, 5, 9, 15, 16, 17, 18, 22 (McAllister pers. comm.); 9, 16 (McAllister and Aniskowicz 1976); 9 (Sekerak et al. 1976b) |
| *Myoxocephalus scorpioides* (Fabricius 1780) | Arctic sc lpin | 5 (B.C. Research 1975); 1 (Ellis 1962); 9 (McAllister pers. comm.); 9 (Sekerak et al. 1976b); 1 (Thomson et al. 1979). |
| *Myoxocephalus scorpius* (Linnaeus 1758) | shorthorn sculpin | 5 (B.C. Research 1975); 5 (Bohn and Fallis 1978); 15 (Holeton 1974); 9, 15 (McAllister pers. comm); 9 (Sekerak et al. 1976b); 1, 3, 4 (Thomson et al. 1979). |
| *Triglops nybelini* Jensen 1944 | bigeye sculpin | 5, 9, 12 (McAllister pers. comm.). |
| *Triglops pingelii* Reinhardt 1831 | ribbed sculpin | 15 (Green and Steele 1975); 21 (Jensen 1910); 9, 15, 17 (McAllister pers. comm.); 3, 4 (Thomson et al. 1979). |
| *Triglops sp.* | sculpin | 12 (Nettleship 1976). |
| F. Agonidae | | |
| *Agonus decagonus* Bloch and Schnieder 1801 | seapoacher | 5 (McAllister pers. comm); 24 (Sekerak et al. 1979). |
| F. Cyclopteridae | | |
| *Cyclopterus jordani* Soldatov 1929 | smooth lumpfish | 5 (Ellis 1962); 12 (McAllister pers. comm.). |
| *Eumicrotremus derjugini* Popov 1926 | leatherfin lumpsucker | 4 (Sekerak et al. 1976a); 4 (Thomson et al. 1979). |
| *Eumicrotremus spinosus* (Muller 1777) | Atlantic spiny lumpsucker | 21 (Jensen 1910); 5, 9, 15 (McAllister pers. comm.); 4 (Sekerak et al. 1976a); 4 (Thomson et al. 1979). |
| *Eumicrotremus sp.* | lumpsucker | 4, 25 (Thomson et al. 1979). |
| F. Liparididae | | |
| *Careproctus reinhardti* (Kroyer 1862) | sea tadpole | 5 (McAllister pers. comm.) |
| *Liparis fabricii* Kroyer 1847 | gelatinous snailfish | 5, 12, 13, 15 (Able and McAllister 1980); 5, 9, 15, 17 (McAllister pers. comm); 1, 2, 3, 4, 23, 24 (Sekerak et al. 1979). |
| *Liparis gibbus* Bean 1881 | dusky snailfish | 15 (Able and McAllister 1980); 21 (McAllister pers. comm.); 1, 23 (Sekerak et al. 1979). |
| *Liparis tunicatus* Reinhardt 1836 | kelp snailfish | 5, 9, 15, 18 (Able and McAllister 1980); 4, 13, 15, 17, 18, 21 (McAllister pers. comm.); 23 (Sekerak et al. 1979). |
| *Liparis sp.* | snailfish | 9 (Sekerak et al. 1976b); 4 (Thomson et al. 1979). |
| F. Gasterosteidae | | |
| *Pungitius pungitius* (Linnaeus 1758) | ninespine stickleback | 15 (Green and Steele 1975). |
| F. Pleuronectidae | | |
| *Reinhardtius hypoglossoides* (Walbaum 1792) | Greenland halibut | 1 (Bissett 1967b). |

# APPENDIX II

## RAW DATA

Table 19. Raw Data from Arctic charr, *Salvelinus alpinus*, caught in 1980 on Devon Island, N.W.T. (See Fig. 2).

| Site | Sampling Location, Date, Time, and Gear | Length (mm) | Weight (g) | Sex | Age (yrs) |
|---|---|---|---|---|---|
| 1 | Unnamed Lake | 561 | 1920 | 10 | 24 |
| | 75°02'N x 88°12'W | 421 | 650 | 0 | 19 |
| | Gill Net #D1 | 460 | 900 | 2 | 17 |
| | 31/7/80 - 3/8/80 | 440 | 740 | 2 | 18 |
| | 84 hours | 501 | 1230 | 8 | 27 |
| | 60 m (10-60 mm mesh) | 526 | 1460 | 2 | 17 |
| | | 472 | 1080 | 2 | 18 |
| | | 502 | 1220 | 9 | - |
| | | 420 | 630 | 2 | 18 |
| | | 441 | 800 | 2 | 18 |
| | | 501 | 1180 | 8 | 24 |
| | | 542 | 1580 | 8 | 29 |
| | | 350 | 360 | 1 | 18 |
| | | 385 | 460 | 9 | 22 |
| | | 293 | 200 | 8 | 19 |
| | | 434 | 750 | 2 | 24 |
| | | 540 | 1550 | 8 | 31 |
| | | 576 | 2020 | 5 | 29 |
| 2 | Unnamed Lake | 347 | 320 | 7 | 20 |
| | 75°01'N x 88°12'W | 249 | 130 | 2 | 13 |
| | Gill Net #D2 | 465 | 780 | 2 | 19 |
| | 31/7/80-3/8/80 | 548 | 1510 | 2 | 18 |
| | 84 hours | 106 | 7.5 | 0 | 7 |
| | 60 m (10-60 mm mesh) | 105 | 10.5 | 0 | 7 |
| 3 | Unnamed Lake | 110 | 10.5 | 0 | 7 |
| | 75°05'N x 88°15'W | 450 | 670 | 8 | 29 |
| | Gill Net #D3 | 354 | 420 | 10 | 16 |
| | 31/7/80 - 3/8/80 | 403 | 560 | 2 | 16 |
| | 84 hours | 330 | 340 | 1 | 18 |
| | 60 m (10-60 mm mesh) | 413 | 630 | 2 | 27 |
| | | 377 | 410 | 8 | 25 |
| | | 375 | 420 | 2 | 23 |
| | | 392 | 470 | 2 | 20 |
| | | 340 | 340 | 2 | 20 |
| | | 270 | 310 | 8 | 21 |
| | | 350 | 390 | 2 | 21 |
| | | 530 | 1510 | 2 | 28 |
| | | 432 | 740 | 4 | 28 |
| | | 393 | 500 | 2 | 24 |
| | | 346 | 380 | 4 | - |
| | | 363 | 340 | 2 | 23 |
| | | 337 | 340 | 2 | 24 |
| | | 381 | 450 | 2 | 28 |
| | | 341 | 370 | 8 | 29 |
| 3 | Unnamed Lake (Continued) | 382 | 470 | 3 | 29 |
| | | 351 | 390 | 8 | 20 |
| | | 378 | 490 | 8 | 26 |
| | | 319 | 280 | 2 | 20 |
| | | 310 | 270 | 2 | 21 |
| | | 358 | 380 | 10 | 21 |
| | | 298 | 220 | 8 | 21 |
| | | 323 | 320 | 2 | 21 |
| | | 360 | 320 | 8 | 24 |
| | | 210 | 70 | 1 | 9 |
| 4* | Unnamed Lake | 96 | 9 | 8 | 7 |
| | 74°57.5'N x 88°15'W | 112 | 14 | 9 | 10 |
| | Gill Net #D4 | 99 | 10 | 4 | 10 |
| | 31/7/80 - 3/8/80 | 104 | 8 | 8 | 11 |
| | 84 hours | 102 | 8 | 8 | 10 |
| | 60 m (10-60 mm mesh) | 100 | 8.5 | 9 | 7 |
| | | 102 | 7 | 8 | 8 |
| | | 91 | 7 | 9 | 8 |
| | | 96 | 8 | 3 | 8 |
| | | 100 | 8.5 | 4 | 9 |
| | | 111 | 10 | 8 | 9 |
| | | 101 | 7 | 8 | 7 |
| | | 101 | 7.5 | - | 7 |
| | | 102 | 8.5 | 9 | 8 |
| | | 102 | 7.5 | 3 | 10 |
| | | 101 | 7.5 | 4 | 11 |
| 5 | Unnamed Lake | 585 | 1920 | 3 | 26 |
| | 75°25.5'N x 88°09'W | 485 | 1140 | 2 | 20 |
| | Gill Net #D5 | 540 | 1540 | 3 | 24 |
| | 5-6/8/80 | 477 | 1000 | 8 | 20 |
| | 28 hours | 410 | 640 | 2 | 26 |
| | 60 m (10-60 mm mesh) | 370 | 420 | 2 | 15 |
| | | 380 | 490 | 8 | 23 |
| | | 345 | 360 | 8 | ** |
| | | 280 | 180 | 8 | 14 |
| | | 230 | 100 | 8 | 15 |
| | | 205 | 60 | 8 | 16 |
| | | 131 | 25.5 | 7 | 7 |
| | | 115 | 16 | 0 | 5 |
| | | 200 | 60 | 7 | ** |
| | | 118 | 23.5 | 0 | ** |

Table 19. (Cont'd)

| Site | Sampling Location, Date, Time, and Gear | Length (mm) | Weight (g) | Sex | Age (yrs) |
|---|---|---|---|---|---|
| 6 | Unnamed Lake<br>75°28'N x 85°09'W<br>Gill Net#D6<br>5-6/8/80<br>28 hours<br>60 m (10-60 mm mesh) | | No Fish | | |
| 7 | Unnamed Lake<br>75°34'N x 85°13'W<br>Gill Net#D7<br>5-6/8/80<br>28 hours<br>60 m (10-60 mm mesh) | 368 | 460 | 8 | 12 |
| | | 333 | 360 | 1 | 23 |
| | | 310 | 260 | 9 | 15 |
| | | 303 | 240 | 7 | 11 |
| | | 150 | 40 | 10 | 11 |
| | | 112 | 12 | 1 | 5 |
| | | 115 | 10.5 | 7 | 5 |
| | | 110 | 10 | 0 | 5 |
| | | 103 | 8.5 | 0 | 5 |
| 8 | Unnamed Lake<br>75°38'N x 85°01'W<br>Gill Net#D8<br>5-6/8/80<br>28 hours<br>60 m (10-60 mm mesh) | 365 | 400 | 1 | 17 |
| | | 207 | 70 | 1 | 11 |
| | | 117 | 14.5 | 7 | 7 |
| | | 110 | 11.5 | 7 | 8 |
| | | 112 | 12 | 7 | 5 |
| | | 118 | 13 | 7 | 5 |
| | | 113 | 13 | 1 | 6 |
| | | 104 | 9.5 | 0 | 5 |
| | | 108 | 10 | 0 | 6 |
| | | 103 | 8.5 | 0 | 5 |
| | | 104 | 9.5 | 0 | 6 |
| | | 110 | 10 | 0 | - |
| | | 112 | 11.5 | 0 | - |
| | | 104 | 9.5 | 0 | - |
| 9 | Littlefish Lake<br>75°37.5'N x 84°25'W<br>Hoopnets DH 1-4<br>5-6/8/80<br>28 hours | 159 | 40 | 1 | 7 |
| | | 158 | 40 | 9 | 15 |
| | | 175 | 45 | 1 | 9 |
| | | 113 | 13.5 | 1 | - |
| | | 150 | 35 | 8 | 17 |
| | | 106 | 12.5 | 0 | 3 |
| | | 52 | 2 | 0 | - |
| 10 | Fishing Lake<br>75°39.5'N x 84°33'W<br>Gill Net#D9<br>6-7/8/80<br>12 hours<br>60 m (10-60 mm mesh) | 622 | 3100 | 11 | 22 |
| | | 450 | 1060 | 3 | 22 |
| | | 400 | 590 | 2 | 21 |
| | | 435 | 920 | 8 | 29 |
| | | 546 | 1580 | 9 | 31 |
| | | 438 | 830 | 3 | 25 |
| | | 404 | 650 | 3 | 27 |
| | | 401 | 600 | 9 | 20 |
| | | 201 | 70 | 7 | 6 |
| | | 231 | 100 | 7 | 11 |
| | | 395 | 540 | 8 | 21 |
| | Gill Net#D10<br>12 hours<br>60 m (10-60 mm mesh) | 257 | 160 | 9 | 11 |
| 11 | Bechel Lake<br>75°39'N x 84°28'W<br>Gill Net#D11<br>6-7/8/80<br>12 hours<br>60 m (10-60 mm mesh) | 411 | 710 | 3 | 20 |
| | | 500 | 1000 | 2 | 28 |
| | | 427 | 680 | 2 | 21 |
| | | 355 | 500 | 9 | 19 |
| | | 481 | 1070 | 2 | 22 |
| | | 408 | 640 | 10 | 22 |
| | | 411 | 500 | 8 | 22 |
| | | 406 | 460 | 8 | 27 |
| | | 536 | 1080 | 2 | 25 |
| | | 442 | 820 | 3 | 25 |
| | | 437 | 760 | 2 | 18 |
| | | 421 | 560 | 8 | 24 |
| | | 382 | 520 | 8 | 18 |
| | | 422 | 680 | 2 | 22 |
| | | 201 | 80 | 3 | 12 |
| | | 98 | 8.5 | 0 | 3 |
| | | 403 | 480 | 8 | - |
| | | 416 | 630 | 8 | - |
| | Hoop Net DH#5<br>Downstream Hoop,<br>6-7/8/80<br>24 hours | 155 | 40 | 1 | - |
| | | 124 | 16.5 | 1 | 4 |
| | | 93 | 7.5 | 0 | 2 |
| | | 94 | 7.5 | 7 | 4 |
| | | 95 | 8.5 | 0 | 3 |
| | | 73 | 3.5 | 0 | 2 |
| | | 74 | 3.5 | 0 | 2 |
| | Hoop Net DH#6<br>Upstream Hoop<br>6-7/8/80<br>24 hours | 194 | 60 | 7 | 7 |
| | | 191 | 55 | 7 | 10 |
| | | 193 | 65 | 2 | 9 |
| | | 160 | 35 | 0 | 7 |

Table 19. (Cont'd)

| Site | Sampling Location, Date, Time, and Gear | Length (mm) | Weight (g) | Sex | Age (yrs) |
|---|---|---|---|---|---|
| 11 | Bechel Lake (Continued) | 152 | 35 | 2 | 7 |
| | | 155 | 35 | 7 | 6 |
| | | 127 | 17.5 | 7 | 4 |
| | | 122 | 16.5 | 1 | 4 |
| | | 124 | 17.5 | 7 | 3 |
| | | 104 | 10 | 0 | 3 |
| | | 105 | 11.5 | 7 | 4 |
| | | 80 | 4.5 | 0 | 2 |
| | | 83 | 5 | 7 | 2 |
| | | 76 | 4.5 | 0 | 2 |
| | | 62 | 2 | 0 | 1 |
| | | 136 | 22 | - | - |
| | | 157 | 35 | - | - |
| | | 152 | 35 | - | - |
| | | 105 | 13 | - | - |
| | | 101 | 11.5 | - | - |
| | | 110 | 16.5 | - | - |
| | | 103 | 10 | - | - |
| | | 100 | 10 | - | - |
| | | 97 | 8 | - | - |
| | | 89 | 6.5 | - | - |
| | | 78 | 4.5 | - | - |
| | | 78 | 4.5 | - | - |
| | | 70 | 3.5 | - | - |
| | | 72 | 4 | - | - |
| | | 69 | 3.5 | - | - |
| | | 98 | 9.5 | - | - |
| | | 114 | 13.5 | - | - |
| | | 122 | 17.5 | - | - |
| | | 70 | 3.5 | - | - |
| | | 94 | 8 | - | - |
| 12 | Unnamed Lake<br>75°37.5'N x 84°29'W<br>Gill Net#D12<br>7-8/8/80<br>12 hours<br>60 m (10-60 mm mesh) | | No Fish | | |
| 13 | Unnamed Lake<br>75°41'N x 84°22.5'W<br>Gill Net#D13&15<br>7-8/8/80<br>12 hours<br>60 m (10-60 mm mesh) | | No Fish | | |
| 14 | Unnamed Lake<br>75°45.5'N x 84°05'W<br>Gill Net#D14<br>7-8/8/80<br>12 hours<br>60 m (10-60 mm mesh) | | No Fish | | |
| 15 | Immerk Lake Outlet<br>75°41'N x 84°33'W<br>Hoop Net #DH7<br>Downstream Hoop<br>7-8/8/80<br>28 hours | 74 | 3.5 | - | - |
| | | 75 | 3 | - | - |
| | | 72 | 3 | - | - |
| | | 78 | 3.5 | 0 | 2 |
| | | 61 | 2 | 0 | 1 |
| | | 72 | 3.5 | 0 | 2 |
| | | 71 | 2.5 | 0 | 2 |
| | | 36 | 0.3 | 0 | - |
| | Hoop Net #DH8<br>Upstream Hoop<br>7/8/80<br>28 hours | 111 | 10.5 | 0 | - |
| | | 77 | 3 | 0 | - |
| | | 85 | 4.5 | 0 | - |
| | | 96 | 7 | 0 | 3 |
| | | 110 | 9.5 | 0 | 3 |
| | | 98 | 7 | 0 | 3 |
| | | 70 | 3 | 0 | 2 |
| | | 72 | 3 | 0 | - |
| 16* | Unnamed Lake<br>75°33'N x 89°53'W<br>Gill Net#D17<br>8-9/8/80<br>21 hours<br>60 m (10-60 mm mesh) | 392 | 470 | 2 | 22 |
| | | 411 | 580 | 2 | 23 |
| | | 380 | 480 | 8 | 24 |
| | | 380 | 440 | 2 | 17 |
| | | 385 | 480 | 8 | 19 |
| | | 216 | 85 | 2 | 7 |
| | | 210 | 70 | 2 | 7 |
| | | 116 | 12 | 1 | 4 |
| | | 117 | 12 | 7 | 4 |
| | | 110 | 12 | 7 | 3 |
| | 8-9/8/80<br>Gill Net#D18<br>21 hours<br>60 m (10-60 mm mesh) | 705 | 3800 | 4 | 23 |
| | | 563 | 2020 | 2 | 19 |
| | | 550 | 1800 | 2 | 18 |
| | | 502 | 1210 | 8 | 17 |
| | | 407 | 670 | 3 | 18 |
| | | 32 | 1.5 | 0 | 0 |
| | | 396 | 470 | 8 | 21 |
| | | 400 | 570 | 2 | 21 |

Table 19. (Cont'd)

| Site | Sampling Location, Date, Time, and Gear | Length (mm) | Weight (g) | Sex | Age (yrs) |
|---|---|---|---|---|---|
| 17 | Unnamed Lake | 241 | 120 | 2 | 14 |
| | 75°10'N x 91°42'W | 297 | 200 | 8 | 18 |
| | Gill Net #D19 | 100 | 7.5 | - | 6 |
| | 8-9/8/80 | 112 | 9 | - | 8 |
| | 21 hours | 125 | 11 | - | 8 |
| | 60 m (10-60 mm mesh) | 124 | 9 | - | 10 |
| | | 110 | 7 | - | 9 |
| | | 110 | 7 | - | 8 |
| | | 139 | 12 | - | 10 |
| | | 125 | 10.5 | - | 8 |
| | | 113 | 7 | - | 7 |
| | | 111 | 6.5 | - | 7 |
| | | 122 | 9.5 | - | 10 |
| | | 115 | 9 | - | 7 |
| | | 127 | 10.5 | - | 8 |
| | | 118 | 10.5 | - | 7 |
| | | 109 | 8.5 | - | 8 |
| | | 116 | 10.5 | - | 7 |
| | | 115 | 7.5 | - | 7 |
| | | 110 | 7 | - | 7 |
| | | 108 | 7 | - | 8 |
| | | 111 | 8.5 | - | 8 |
| | | 110 | 8.5 | - | 7 |
| | | 109 | 7 | - | 7 |
| | | 125 | 9.5 | - | - |
| | | 111 | 8 | - | 8 |
| | | 114 | 8.5 | - | 8 |
| | | 122 | 10 | - | 8 |
| | | 111 | 7 | - | 8 |
| | | 111 | 7.5 | - | 7 |
| | | 120 | 10 | - | 7 |
| 18 | Unnamed Lake | 500 | 1000 | 8 | 32 |
| | 75°11'N x 91°54'W | 480 | 1050 | 9 | 37 |
| | Gill Net #D20 | 491 | 950 | 4 | 38 |
| | 8-9/8/80 | 505 | 1250 | 3 | 33 |
| | 21 hours | 471 | 920 | 2 | 30 |
| | 60 m (10-60 mm mesh) | 440 | 800 | 2 | 22 |
| | | 446 | 740 | 3 | 33 |
| | | 440 | 660 | 3 | 24 |
| | | 392 | 390 | 8 | 24 |
| | | 320 | 270 | 1 | 20 |
| | | 355 | 360 | 8 | 26 |
| | | 375 | 320 | 2 | 25 |
| | | 115 | 12 | 7 | 8 |

*Water chemistry and zooplankton samples taken at this site.

**Specimen available at Nat. Museum of Natural Sciences, Ottawa.

Table 20. Raw Data from Arctic Charr, *Salvelinus alpinus*, caught in 1980 on Cornwallis Island, N.W.T. (See Fig. 4).

| Site | Sampling Location, Date, Time, and Gear | Length (mm) | Weight (g) | Sex | Age (yrs) |
|---|---|---|---|---|---|
| 1* | Nelson Lake | 345 | 320 | 8 | 15 |
| | 74°42'N x 94°18'W | 336 | 320 | 8 | 14 |
| | 1/8/80 | 334 | 300 | 1 | 14 |
| | 11 hours | 312 | 280 | 8 | 14 |
| | Gill Net #C1 | 345 | 320 | 9 | - |
| | 120 m (10-25 mm mesh) | 300 | 210 | 7 | 14 |
| | | 335 | 340 | 8 | 15 |
| | | 320 | 360 | 7 | 12 |
| | | 262 | 160 | 1 | 9 |
| | | 354 | 410 | 9 | 19 |
| | | 375 | 460 | 2 | 15 |
| | | 317 | 370 | 7 | 16 |
| | | 292 | 230 | 7 | 9 |
| | | 335 | 330 | 8 | 18 |
| | | 375 | 480 | 2 | 17 |
| | | 320 | 270 | 1 | 17 |
| | | 365 | 400 | 8 | 19 |
| | | 345 | 340 | 7 | 12 |
| | | 354 | 360 | 8 | - |
| | | 540 | 1840 | 3 | 27 |
| | | 465 | 1020 | 3 | 19 |
| | | 260 | 150 | 1 | 11 |
| | | 250 | 140 | 1 | 10 |
| | | 250 | 160 | 7 | 11 |
| | | 338 | 340 | 9 | 16 |
| | | 332 | 300 | 8 | 13 |
| | | 310 | 300 | 1 | 13 |
| | | 345 | 340 | 1 | 16 |
| | | 325 | 280 | 1 | 12 |
| | | 390 | 480 | 2 | 17 |
| | | 415 | 580 | 2 | 19 |
| | | 270 | 190 | 7 | 12 |
| | Gill Net #C2 | 330 | 300 | 8 | 18 |
| | 1/8/80 | 345 | 340 | 2 | 15 |
| | 11 hours | 300 | 220 | 1 | 13 |
| | 120 m (10-60 mm mesh) | 400 | 560 | 3 | 19 |
| | | 360 | 360 | 8 | 12 |
| | | 327 | 360 | 3 | 14 |
| | | 350 | 350 | 8 | 16 |
| | | 252 | 150 | 1 | 10 |
| | | 314 | 260 | 1 | 13 |
| | | 340 | 340 | 1 | 13 |
| | | 380 | 400 | 8 | 18 |
| | | 350 | 360 | 8 | 16 |
| | | 348 | 330 | 1 | 19 |

| Site | Sampling Location, Date, Time, and Gear | Length (mm) | Weight (g) | Sex | Age (yrs) |
|---|---|---|---|---|---|
| 1* | Nelson Lake (Continued) | 286 | 200 | 7 | 11 |
| | | 370 | 440 | 2 | 13 |
| | | 371 | 400 | 9 | 17 |
| | | 347 | 360 | 9 | 15 |
| | | 289 | 200 | 8 | 13 |
| | | 411 | 610 | 8 | 19 |
| | | 263 | 170 | 1 | 10 |
| | | 262 | 180 | 1 | 11 |
| | | 368 | 380 | 8 | 18 |
| | | 375 | 430 | 8 | 17 |
| | Gill Net #C3 | 372 | 360 | 8 | 18 |
| | 1-3/8/80 | 350 | 370 | 8 | 18 |
| | 36 hours | 388 | 500 | 2 | 16 |
| | 60 m (10-60 mm mesh) | 344 | 400 | 8 | 13 |
| | | 315 | 300 | 8 | 13 |
| | | 345 | 340 | 1 | 14 |
| | | 325 | 290 | 7 | 11 |
| | | 394 | 520 | 2 | 17 |
| | | 363 | 380 | 10 | 15 |
| | | 332 | 300 | 2 | 16 |
| | | 480 | 1260 | 3 | 17 |
| | | 500 | 1400 | 3 | 21 |
| | | 352 | 400 | 8 | 17 |
| | | 295 | 230 | 8 | 13 |
| | | 280 | 200 | 1 | 11 |
| | | 240 | 120 | 7 | 10 |
| | | 252 | 140 | 1 | 11 |
| | | 217 | 90 | 7 | 9 |
| | | 210 | 80 | 7 | 10 |
| | | 182 | 50 | 0 | - |
| | | 190 | 60 | 7 | 9 |
| | Gill Net #C4 | 342 | 360 | 8 | 13 |
| | 1-3/8/80 | 382 | 440 | 8 | 17 |
| | 36 hours | 450 | 740 | 2 | 20 |
| | 120 m (10-25 mm mesh) | 370 | 400 | 2 | 15 |
| | | 374 | 370 | 2 | 17 |
| | | 374 | 450 | 2 | 12 |
| | | 396 | 480 | 8 | 17 |
| | | 416 | 560 | 2 | 17 |
| | | 344 | 340 | 8 | 13 |
| | | 337 | 310 | 2 | 18 |
| | | 328 | 320 | 10 | 14 |
| | | 420 | 630 | 2 | 19 |
| | | 312 | 260 | 8 | 15 |
| | | 345 | 300 | 2 | 15 |
| | | 367 | 446 | 2 | 15 |

Table 20. (Cont'd)

| Site | Sampling Location, Date, Time, and Gear | Length (mm) | Weight (g) | Sex | Age (yrs) |
|---|---|---|---|---|---|
| 1* | Nelson Lake (Continued) | 348 | 300 | 8 | 19 |
| | | 334 | 310 | 1 | 13 |
| | | 363 | 380 | 8 | 15 |
| | | 358 | 380 | 2 | 13 |
| | | 376 | 420 | 8 | 21 |
| | | 337 | 360 | 2 | 16 |
| | | 345 | 280 | 8 | - |
| | | 324 | 280 | 1 | 13 |
| | | 310 | 280 | 1 | - |
| | | 250 | 140 | 7 | 10 |
| | | 365 | 360 | 8 | 18 |
| | | 450 | 720 | 3 | ** |
| | | 355 | 400 | 2 | ** |
| | | 333 | 320 | 9 | ** |
| | | 295 | 220 | 1 | ** |
| | | 360 | 430 | 8 | ** |
| | | 290 | 220 | 1 | ** |
| | | 180 | 50 | 0 | ** |
| | | 152 | 40 | 0 | ** |
| 2 | Unnamed Lake 75°28'N x 95°44'W Gill Net #C5 9-10/8/80 15 hours 60 m (10-60 mm mesh) | 460 | 940 | 3 | 21 |
| | | 360 | 460 | 2 | 12 |
| | | 475 | 800 | 8 | 19 |
| | | 456 | 750 | 8 | 17 |
| | | 416 | 690 | 2 | 13 |
| | | 530 | 1450 | 4 | 21 |
| | | 556 | 1580 | 2 | - |
| | | 480 | 790 | 2 | 18 |
| | | 535 | 1470 | 3 | 20 |
| | | 252 | 120 | 1 | 7 |
| 3 | Unnamed Lake 75°27.5'N x 95°42'W Gill Net #C6 9-10/8/80 15 hours 60 m (10-60 mm mesh) | 223 | 90 | 2 | 6 |
| | | 191 | 60 | 1 | 11 |
| | | 202 | 75 | 3 | 7 |
| | | 211 | 80 | 3 | 7 |
| | | 235 | 100 | 2 | 7 |
| | | 250 | 130 | 1 | 6 |
| | | 230 | 100 | 7 | 5 |
| | | 257 | 140 | 1 | 7 |
| | | 231 | 90 | 7 | 7 |
| | | 197 | 65 | 1 | 7 |
| | | 243 | 115 | 1 | 7 |
| | | 330 | 330 | 9 | 15 |
| | | 424 | 660 | 8 | 25 |
| | | 388 | 430 | 3 | 27 |
| 3 | Unnamed Lake (Continued) | 360 | 430 | 8 | 23 |
| | | 430 | 840 | 3 | 25 |
| | | 432 | 910 | 2 | 26 |
| | | 438 | 800 | 3 | 21 |
| | | 285 | 220 | 8 | 18 |
| | | 230 | 100 | 7 | 6 |
| | | 200 | 70 | 0 | 7 |
| | | 217 | 85 | 7 | 6 |
| | | 207 | 70 | 7 | 6 |
| | | 208 | 70 | 7 | 6 |
| | | 205 | 70 | 7 | 6 |
| | | 199 | 65 | 7 | 7 |
| | | 197 | 60 | 7 | 6 |
| | | 196 | 55 | 7 | 5 |
| | | 208 | 75 | 7 | 6 |
| | | 199 | 60 | 1 | 5 |
| | | 160 | 40 | 7 | 6 |
| | | 126 | 16.5 | 0 | - |
| | | 106 | 10 | 0 | 3 |
| | | 104 | 9.5 | 0 | 3 |
| | | 112 | 12 | 7 | 3 |
| 4* | Unnamed Lake 75°26'N x 95°38'W Gill Net #C7 9-10/8/80 15 hours 60 m (10-60 mm mesh) | 416 | 755 | 3 | 14 |
| | | 476 | 710 | 2 | 17 |
| | | 426 | 850 | 2 | 14 |
| | | 420 | 775 | 2 | 13 |
| | | 414 | 560 | 10 | 18 |
| | | 460 | 920 | 3 | 17 |
| | | 405 | 645 | 8 | 16 |
| | | 410 | 680 | 9 | 13 |
| | | 432 | 840 | 3 | 13 |
| | | 448 | 720 | 2 | 22 |
| | | 437 | 690 | 3 | 20 |
| | | 438 | 760 | 10 | 17 |
| | | 402 | 560 | 9 | 16 |
| | | 412 | - | 9 | 18 |
| | | 450 | 770 | 8 | 14 |
| | | 394 | 500 | 9 | 18 |
| | | 404 | 680 | 2 | 13 |
| | | 407 | 555 | 2 | 21 |
| | | 401 | 420 | 8 | 17 |
| | | 222 | 90 | 7 | 9 |
| | | 218 | 90 | 7 | 7 |

Table 20. (Cont'd)

| Site | Sampling Location, Date, Time, and Gear | Length (mm) | Weight (g) | Sex | Age (yrs) |
|---|---|---|---|---|---|
| 4* | Unnamed Lake (Continued) Gill Net#C8 9-10/8/80 15 hours 60 m (10-60 mm mesh) | 415 | 610 | 8 | 22 |
| | | 410 | 690 | 2 | - |
| | | 214 | 75 | 7 | 7 |
| | | 221 | 85 | 7 | 5 |
| | | 404 | 640 | 2 | 20 |
| | | 439 | 700 | 2 | 19 |
| | | 415 | 640 | 8 | - |
| | | 429 | 800 | 2 | 16 |
| | | 460 | 820 | 3 | 19 |
| | | 451 | 820 | 3 | 18 |
| | | 370 | 520 | 2 | 12 |
| | | 414 | 660 | 8 | 16 |
| | | 443 | 790 | 2 | 20 |
| | | 203 | 60 | 7 | 6 |
| | | 232 | 110 | 7 | 6 |
| | | 252 | 140 | 1 | 6 |
| | | 230 | 90 | 7 | 8 |
| | | 213 | 80 | 7 | 7 |
| | | 106 | 10.5 | 0 | 5 |
| | | 120 | 12.5 | 0 | 4 |
| | | 131 | 15.5 | 0 | - |
| | | 118 | 13.5 | 7 | 5 |
| 5* | Meretta Lake $74^{\circ}41.5'N \times 94^{\circ}59'W$ Gill Net# C9 & 10 13-14/8/80 19 hours and 24 hours 120 m (10-25 mm mesh) | No Fish | | | |

*Water chemistry and zooplankton samples taken at this site.

**Specimen available at Nat. Museum of Natural Sciences, Ottawa.

Table 21. Raw Data from Arctic charr, *Salvelinus alpinus*, caught in 1980 on Somerset Island, N.W.T. (See Fig. 7)

| Site | Sampling Location, Date, Time, and Gear | Length (mm) | Weight (g) | Sex | Age (yrs) |
|---|---|---|---|---|---|
| 1 * | Unnamed Lake | 555 | 1660 | 2 | 17 |
| | 73°56'N x 92°15'W | 525 | 1450 | 2 | 12 |
| | Gill Net #S1 | 400 | 520 | 8 | 21 |
| | 13-14/8/80 | 690 | 3450 | 9 | 26 |
| | 24 hours | 169 | 40 | 7 | 6 |
| | 60 m (10-60 mm mesh) | 129 | 18.5 | 1 | 5 |
| | Gill Net #S2 | 572 | 1950 | 9 | 20 |
| | 13-14/8/80 | 404 | 620 | 2 | 14 |
| | 24 hours | 457 | 870 | 2 | 18 |
| | 60 m (10-60 mm mesh) | | | | |
| 2 | Unnamed Lake | | No Fish | | |
| | 73°55'N x 92°29'W | | | | |
| | Gill Net #S3 | | | | |
| | 13-14/8/80 | | | | |
| | 24 hours | | | | |
| | 60 m (10-60 mm mesh) | | | | |
| 3 | Unnamed Lake | 451 | 810 | 2 | 13 |
| | 73°57'N x 92°52'W | 103 | 8.5 | 7 | 6 |
| | Gill Net #S4 | 105 | 8.5 | 1 | 6 |
| | 13-14/8/80 | 580 | 1880 | 2 | 27 |
| | 24 hours | | | | |
| | 60 m (10-60 mm mesh) | | | | |

*Water chemistry and zooplankton samples taken at this site.

Table 22. Raw Data from Arctic Charr, *Salvelinus alpinus*, and Ninespine Stickleback, *Pungitius pungitius*, caught in 1980 on Baffin Island, N.W.T. (See Fig. 10)

| Site | Sampling Location, Date, Time, and Gear | Length (mm) | Weight (g) | Sex | Age (yrs) |
|---|---|---|---|---|---|
| | ARCTIC CHARR | | | | |
| 1 | Icebound Lake | 660 | 3250 | 5 | 21 |
| | 71°42.5'N x 79°27'W | 558 | 1910 | 8 | 25 |
| | Gill Net#B1 | 600 | 1770 | 4 | 31 |
| | 14-20/8/80 | 648 | 2300 | 5 | 33 |
| | 20 hours | 604 | 2300 | 5 | 32 |
| | 60 m (10-60 mm mesh) | 617 | 2200 | 5 | 30 |
| | | 580 | 2100 | 5 | 31 |
| | | 511 | 1210 | 2 | 17 |
| | | 475 | 1060 | 2 | 12 |
| | | 516 | 800 | 8 | 30 |
| | | 390 | 500 | 2 | 15 |
| | | 360 | 330 | 8 | 24 |
| | | 300 | 210 | 1 | 15 |
| | | 309 | 240 | 1 | 21 |
| | | 281 | 200 | 8 | 14 |
| | | 287 | 180 | 8 | 20 |
| | | 234 | 100 | 7 | 10 |
| | 71°44'N x 79°28'W | 638 | 2150 | 2 | 31 |
| | Gill Net#B2 | 557 | 1630 | 2 | 34 |
| | 19-20/8/80 | 574 | 2050 | 4 | 27 |
| | 20 hours | 364 | 360 | 8 | 17 |
| | 60 m (10-60 mm mesh) | 342 | 360 | 2 | 21 |
| | | 332 | 330 | 1 | 23 |
| | | 458 | 880 | 8 | 20 |
| | | 318 | 220 | 8 | - |
| | | 230 | 95 | 1 | 11 |
| | | 271 | 155 | 1 | 20 |
| | | 264 | 135 | 1 | 21 |
| | | 310 | 210 | 1 | 11 |
| | | 104 | 9 | 7 | 7 |
| 2 | Unnamed Lake | | No Fish | | |
| | 71°46'N x 79°27'W | | | | |
| | Gill Net#B3 | | | | |
| | 19-20/8/80 | | | | |
| | 20 hours | | | | |
| | 60 mm (10-60 mm mesh) | | | | |
| 3 | Unnamed Lake | 415 | 500 | 8 | 22 |
| | 71°47'N x 79°25'W | 375 | 440 | 8 | - |
| | Gill Net#B4 | | | | |
| | 19-20/8/80 | | | | |
| | 20 hours | | | | |
| | 60 m (10-60 mm mesh) | | | | |
| 4* | Nina Bang Lake | 458 | 860 | 2 | 25 |
| | 70°52'N x 79°36'W | 491 | 1380 | 8 | 26 |
| | Gill Net#B5 | 411 | 690 | 2 | 25 |
| | 20-21/8/80 | 433 | 740 | 8 | 14 |
| | 22 hours | 477 | 1140 | 2 | 25 |
| | 60 m (10-60 mm mesh) | 361 | 400 | 2 | 21 |
| | Gill Net #B6 | 516 | 1380 | 8 | 20 |
| | 22 hours | 547 | 1590 | 2 | 24 |
| | 60 m (10-60 mm mesh) | 621 | 2800 | 2 | 30 |
| | | 551 | 1630 | 2 | 24 |
| | | 437 | 760 | 8 | 25 |
| | | 408 | 640 | 2 | 13 |
| | | 451 | 870 | 2 | 19 |
| | | 500 | 1080 | 8 | - |
| | | 422 | 840 | 2 | 21 |
| | | 309 | 265 | 9 | 14 |
| | | 362 | 460 | 2 | 15 |
| | | 396 | 580 | 8 | 21 |
| | | 350 | 380 | 2 | 19 |
| | | 343 | 370 | 2 | 19 |
| | | 353 | 290 | 2 | 23 |
| | | 220 | 80 | 7 | 9 |
| | | 109 | 10 | 7 | 6 |
| | | 119 | 10 | 7 | 7 |
| | 70°52'N x 79°35'W | 395 | 560 | 2 | 19 |
| | Gill Net #B7 | 516 | 360 | 2 | 16 |
| | 22 hours | 383 | 500 | 8 | 16 |
| | 60 m (10-60 mm mesh) | 409 | 700 | 2 | 13 |
| | | 345 | 395 | 2 | 12 |
| | | 380 | 380 | 8 | 17 |
| | | 336 | 330 | 2 | 19 |
| | | 279 | 180 | 2 | 18 |
| | | 226 | 115 | 7 | 9 |

Table 22. (Cont'd)

| Site | Sampling Location, Date, Time, and Gear | Length (mm) | Weight (g) | Sex | Age (yrs) |
|---|---|---|---|---|---|
| 4* | Nina Bang Lake (Continued) | 240 | 120 | 7 | 10 |
| | | 240 | 100 | 2 | 14 |
| | | 224 | 80 | 7 | 11 |
| | | 204 | 70 | 7 | 8 |
| | | 217 | 100 | 1 | 8 |
| | | 213 | 75 | 7 | 9 |
| | | 234 | 115 | 2 | 10 |
| | 70°52.5'N x 79°34'W | 476 | 1080 | 8 | 22 |
| | Gill Net #B8 | 403 | 930 | 2 | 23 |
| | 22 hours | 512 | 1300 | 2 | 29 |
| | 60 m (10-60 mm mesh) | 435 | 910 | 2 | 15 |
| | | 482 | 1240 | 2 | 26 |
| | | 530 | 1385 | 2 | 26 |
| | | 379 | 530 | 9 | 16 |
| | | 360 | 450 | 8 | 18 |
| | | 372 | 470 | 2 | 17 |
| | | 356 | 420 | 2 | 18 |
| | | 220 | 90 | 7 | 11 |
| | | 362 | 460 | 3 | 17 |
| | | 119 | 13.5 | 1 | 6 |
| 5 | Angajurjualuk Lake | 342 | 360 | 2 | 12 |
| | 71°10.5'N x 79°21'W | 366 | 420 | 8 | 16 |
| | Gill Net #B9 | 340 | 370 | 8 | 14 |
| | 21-23/8/80 | 385 | 490 | 2 | 21 |
| | 41 hours | 400 | 560 | 4 | 19 |
| | 60 m (10-60 mm mesh) | 362 | 455 | 8 | 19 |
| | | 107 | 10 | 7 | 6 |
| | | 109 | 10 | 1 | 4 |
| | | 115 | 10.5 | 1 | 8 |
| | 71°11'N x 79°21'W | 307 | 240 | 8 | 11 |
| | Gill Net #B10 | 215 | 70 | 9 | 13 |
| | 21-23/8/80 | 110 | 10.5 | 1 | 6 |
| | 41 hours | 115 | 11.5 | 0 | 8 |
| | 60 m (10-60 mm mesh) | 107 | 10 | 1 | 6 |
| | | 102 | 8 | 1 | 5 |
| | | 102 | 8 | 7 | 5 |
| | | 362 | 455 | 2 | ** |
| | | 326 | 240 | 2 | ** |
| | | 204 | 60 | - | ** |
| | | 117 | 12 | - | ** |
| | | 111 | 9.5 | 7 | ** |
| | | 107 | 7.5 | - | ** |
| | | 101 | 7.5 | - | ** |
| | | 107 | 8.5 | 7 | ** |
| 6 | Unnamed Lake | 574 | 2050 | 5 | 29 |
| | 71°14'N x 79°09'W | 304 | 290 | 2 | 11 |
| | Gill Net #B11 | 437 | 760 | 2 | 24 |
| | 21-23/8/80 | 427 | 860 | 4 | 28 |
| | 41 hours | 126 | 14.5 | 1 | 6 |
| | 60 m (10-60 mm mesh) | 107 | 9.5 | 7 | 4 |
| 7* | Unnamed Lake | 415 | 360 | 8 | 25 |
| | 71°48'N x 79°22.5'W | 489 | 770 | 2 | 27 |
| | Gill Net #B12 | 490 | 1200 | 10 | 25 |
| | 21-23/8/80 | 427 | 660 | 4 | 28 |
| | 41 hours | 451 | 880 | 5 | 32 |
| | 60 m (10-60 mm mesh) | 420 | 700 | 4 | 23 |
| | | 444 | 700 | 4 | 30 |
| | | 425 | 700 | 4 | 24 |
| | | 115 | 10 | - | ** |
| | | 128 | 15 | - | ** |
| | | 104 | 9 | - | ** |
| | | 107 | 11 | - | ** |
| | | 106 | 9 | - | ** |
| | | 103 | 12.5 | - | ** |
| | | 115 | 12.5 | - | 6 |
| | | 121 | 16 | 9 | 5 |
| | | 114 | 12.5 | 2 | 5 |
| | | 130 | 15.5 | 9 | 9 |
| | | 123 | 10 | - | 8 |
| | | 109 | 11 | - | 5 |
| | | 108 | 9.5 | 8 | 5 |
| | | 116 | 12.5 | 8 | 5 |
| | | 104 | 8 | 7 | 5 |
| | | 102 | 9 | 1 | 5 |
| | | 100 | 8 | 1 | 5 |
| | | 108 | 10.5 | 2 | 6 |
| 8* | Erichsen Lake | 418 | 755 | 5 | 31 |
| | 70°44.5'N x 80°38'W | 385 | 475 | 10 | 22 |
| | Gill Net #B13 | 404 | 570 | 2 | 24 |
| | 23-26/8/80 | 428 | 710 | 2 | 21 |
| | 68.5 hours | 431 | 760 | 5 | 23 |
| | 60 m (10-60 mm mesh) | 423 | 640 | 2 | 22 |
| | | 452 | 840 | 2 | 24 |
| | | 416 | 460 | 2 | 28 |
| | | 391 | 520 | 8 | - |
| | | 440 | 680 | 2 | 18 |
| | | 403 | 575 | 8 | 21 |

Table 22. (Cont'd)

| Site | Sampling Location, Date, Time, and Gear | Length (mm) | Weight (g) | Sex | Age (yrs) |
|---|---|---|---|---|---|
| 8* | Erichsen Lake (Continued) | 425 | 720 | 10 | 20 |
| | | 344 | 340 | 10 | 19 |
| | | 318 | 280 | 2 | 16 |
| | | 373 | 370 | 4 | 26 |
| | | 290 | 265 | 8 | 15 |
| | | 256 | 145 | 7 | 12 |
| | | 292 | 265 | 2 | 15 |
| | | 238 | 120 | 1 | 11 |
| | | 161 | 40 | 7 | 7 |
| | | 111 | 13.5 | 3 | 8 |
| | | 102 | 10 | 3 | 6 |
| | | 104 | 9 | 3 | 6 |
| | | 104 | 11.5 | 3 | 6 |
| | | 97 | 8.5 | 3 | 6 |
| | | 106 | 11 | 3 | 8 |
| | | 90 | 7 | 2 | 7 |
| | | 85 | 7.5 | 3 | 6 |
| | | 102 | 8.5 | 3 | 6 |
| | | 106 | 10.5 | 3 | 6 |
| | | 96 | 8 | 3 | 8 |
| | | 119 | - | 8 | 7 |
| | | 98 | - | 3 | 6 |
| | | 95 | 8 | 3 | 6 |
| | | 105 | 12 | - | ** |
| | | 100 | 9.5 | - | ** |
| | | 97 | 9 | - | ** |
| | | 114 | 13 | - | ** |
| | | 109 | 11 | - | ** |
| | | 104 | 13.5 | - | ** |
| | | 101 | 11 | - | ** |
| | | 103 | 10.5 | - | ** |
| | | 100 | 9.5 | - | ** |
| | | 99 | 10 | - | ** |
| | | 98 | 8.5 | 3 | 7 |
| | | 109 | 10.5 | 3 | 6 |
| | | 97 | 9 | 3 | 5 |
| | | 110 | 11.5 | 9 | 8 |
| | | 102 | 9.5 | 8 | 7 |
| | | 103 | 10 | 3 | 6 |
| | | 100 | 9.5 | 8 | 7 |
| | | 94 | 7 | 3 | 6 |
| | | 101 | 10.5 | 3 | 6 |
| | | 100 | 11 | 3 | 5 |
| | | 107 | 12.5 | 3 | 6 |
| 8* | Erichsen Lake (Continued) | 105 | 12.5 | 3 | 6 |
| | | 106 | - | 2 | 7 |
| | | 100 | 10 | 3 | 6 |
| | | 97 | 8.5 | 3 | 6 |
| | | 88 | 7 | 3 | 5 |
| | | 106 | 10.5 | 3 | 9 |
| | | 108 | 11.5 | 9 | 6 |
| | | 101 | 10 | 2 | 6 |
| | | 100 | 10.5 | 3 | 6 |
| | | 104 | - | 3 | 6 |
| | | 102 | - | 3 | 7 |
| | | 106 | - | 8 | 8 |
| | | 93 | 8 | 3 | 5 |
| | | 95 | 9 | 3 | 6 |
| | | 100 | 9 | 3 | 5 |
| | | 101 | - | 2 | 6 |
| | | 103 | - | 3 | 6 |
| | 70°43.5'N x 80°39'W | 583 | 1960 | 8 | - |
| | Gill Net #B14 | 520 | 1400 | 2 | 20 |
| | 23-26/8/80 | 438 | 760 | 8 | 16 |
| | 68.5 hours | 384 | 445 | 3 | 21 |
| | 60 m (10-60 mm mesh) | 385 | 460 | 8 | 23 |
| | | 313 | 265 | 1 | 16 |
| | | 294 | 240 | 7 | 14 |
| | | 220 | 105 | 8 | 12 |
| | | 206 | 75 | 7 | 8 |
| | | 365 | 360 | 2 | 21 |
| | | 324 | 295 | 10 | 16 |
| | | 191 | 60 | 7 | 9 |
| | | 182 | 55 | 1 | 10 |
| | | 211 | 80 | 1 | 11 |
| | | 218 | 85 | - | ** |
| | | 243 | 120 | - | ** |
| | | 165 | 40 | - | ** |
| | | 136 | 25 | - | ** |
| | | 101 | 10 | - | ** |
| | | 108 | 13.5 | - | ** |
| | | 103 | 11.5 | - | ** |
| | | 103 | 11.5 | - | ** |
| | | 101 | 10.5 | 9 | 5 |
| | | 111 | 12 | 2 | 5 |
| | | 112 | 12.5 | - | 5 |
| | | 117 | 12 | 8 | 8 |
| | | 110 | 10 | 8 | 8 |

Table 22. (Cont'd)

| Site | Sampling Location, Date, Time, and Gear | Length (mm) | Weight (g) | Sex | Age (yrs) |
|---|---|---|---|---|---|
| 8* | Erichsen Lake | 99 | 8 | - | 5 |
| | (Continued) | 107 | 11.5 | 7 | 5 |
| | | 94 | 7.5 | 3 | 6 |
| | | 114 | 10.5 | 2 | 6 |
| | | 107 | 11.5 | - | 6 |
| | | 97 | 8 | - | 5 |
| | | 92 | 7.5 | 3 | 5 |
| | $70^{\circ}38'N \times 80^{\circ}53'W$ | 393 | 525 | 8 | 22 |
| | Gill Net #B15 | 382 | 500 | 2 | 20 |
| | 23-26/8/80 | 416 | 590 | 8 | 22 |
| | 68.5 hours | 324 | 345 | 8 | 20 |
| | 60 m (10-60 mm mesh) | 546 | 960 | 2 | 25 |
| | | 465 | 900 | 2 | 16 |
| | | 362 | 445 | 2 | 16 |
| | | 403 | 580 | 8 | 20 |
| | | 425 | 710 | 8 | 17 |
| | | 372 | - | 2 | 19 |
| | | 330 | 370 | 2 | 15 |
| | | 343 | 375 | 8 | 18 |
| | | 343 | 450 | 8 | 20 |
| | | 420 | 620 | 2 | 24 |
| | | 116 | 13 | 7 | 5 |
| | | 99 | 7.5 | 0 | 6 |
| | $70^{\circ}38'N \times 80^{\circ}55'W$ | 481 | 1260 | 8 | 18 |
| | Gill Net #B16 | 362 | 465 | 2 | 19 |
| | 23-26/8/80 | 413 | 720 | 8 | 20 |
| | 68.5 hours | 455 | 600 | 2 | 20 |
| | 60 m (10-60 mm mesh) | 373 | 440 | 2 | 15 |
| | | 343 | 360 | 8 | 19 |
| | | 375 | 395 | 2 | 25 |
| | | 325 | 305 | 2 | 19 |
| | | 369 | 470 | 2 | 11 |
| | | 94 | 8 | 0 | 5 |
| | | 98 | 9 | 0 | 7 |
| | | 382 | 455 | 8 | ** |
| | | 488 | 980 | 2 | ** |
| | | 375 | 490 | 2 | ** |
| | | 331 | 321 | 2 | ** |
| | | 380 | 485 | 2 | ** |
| | | 164 | 40 | 5 | ** |
| | | 151 | 35 | 2 | ** |
| | | 117 | 12.5 | 3 | ** |

| Site | Sampling Location, Date, Time, and Gear | Length (mm) | Weight (g) | Sex | Age (yrs) |
|---|---|---|---|---|---|
| 9 | Unnamed Lake | 376 | 410 | 9 | 22 |
| | $71^{\circ}21N \times 84^{\circ}37'W$ | 331 | 335 | 2 | 15 |
| | Gill Net #B17 | 367 | 440 | 2 | 15 |
| | 26-27/8/80 | 364 | 450 | 8 | 17 |
| | 13 hours | 373 | 430 | 2 | 13 |
| | 60 m (10-60 mm mesh) | 362 | 390 | 8 | 19 |
| | | 325 | 320 | 2 | 14 |
| | | 365 | 450 | 8 | 21 |
| | | 290 | 190 | 7 | 13 |
| | | 253 | 125 | 7 | 10 |
| | | 283 | 200 | 2 | 11 |
| | | 208 | 60 | 3 | 21 |
| | | 260 | 140 | 2 | 10 |
| | | 177 | 40 | 10 | 19 |
| | | 106 | 10.5 | 7 | 6 |
| | | 132 | 16.5 | 1 | 6 |
| | | 102 | 8 | 1 | 5 |
| | | 112 | 10.5 | 7 | 4 |
| | | 110 | 11 | 1 | 6 |
| | | 101 | 8 | 1 | 6 |
| | | 122 | 14 | 1 | 5 |
| | | 106 | 10.5 | 7 | 6 |
| | | 96 | 7.5 | 1 | 6 |
| | | 104 | 9.5 | 1 | 5 |
| | | 103 | 8.5 | 1 | 5 |
| | | 104 | 9 | 1 | 6 |
| | Gill Net #B18 | 543 | 1535 | 10 | 18 |
| | 26-27/8/80 | 486 | 1000 | 5 | 28 |
| | 13 hours | 450 | 800 | 5 | 24 |
| | 60 m (10-60 mm mesh) | 525 | 1300 | 5 | 25 |
| | | 422 | 720 | 2 | 21 |
| | | 437 | 685 | 2 | 21 |
| | | 385 | 510 | 2 | 17 |
| | | 360 | 380 | 2 | 20 |
| | | 351 | 370 | 2 | 14 |
| | | 340 | 370 | 10 | 20 |
| | | 296 | 210 | 2 | 14 |
| | | 422 | 670 | 2 | 17 |
| | | 332 | 305 | 2 | 14 |
| | | 295 | 250 | 7 | 12 |
| | | 218 | 90 | 10 | 10 |
| | | 191 | 60 | 4 | 15 |
| | | 194 | 55 | 7 | 6 |
| | | 185 | 50 | 1 | 6 |
| | | 130 | 17.5 | 8 | 7 |
| | | 112 | 12.5 | 1 | 7 |

Table 22.(Cont'd)

| Site | Sampling Location, Date, Time, and Gear | Length (mm) | Weight (g) | Sex | Age (yrs) |
|---|---|---|---|---|---|
| 10 | Unnamed Lake<br>72°00'N x 84°26 W<br>Gill Net B#19<br>27-28/8/80<br>24 hours<br>60 m (10-60 mm mesh) | 283 | 205 | 2 | 13 |
| | | 373 | 490 | 8 | 13 |
| | | 250 | 135 | 1 | 11 |
| | | 454 | 850 | 2 | 17 |
| | | 365 | 440 | 8 | 18 |
| | | 227 | 105 | 4 | 13 |
| | | 215 | 90 | 4 | 13 |
| | | 200 | 60 | 5 | 12 |
| | | 182 | 45 | 5 | 8 |
| | | 220 | 95 | 5 | - |
| | | 194 | 60 | 5 | 13 |
| | | 207 | 70 | 5 | - |
| | | 194 | 70 | 5 | 11 |
| | | 197 | 60 | 4 | 13 |
| | | 186 | 65 | 5 | 11 |
| | | 169 | 45 | 5 | 10 |
| | | 187 | 60 | 5 | 12 |
| | | 180 | 50 | 11 | 13 |
| | | 195 | 60 | 10 | 11 |
| | | 192 | 60 | 2 | 11 |
| | | 206 | 75 | 11 | 12 |
| | | 26 (Fry) | - | 0 | ** |
| | | 127 | 6 | - | 5 |
| | | 107 | 9.5 | - | 5 |
| | | 119 | 12.5 | - | - |
| | | 115 | 9 | - | - |
| | | 117 | 11 | - | 6 |
| | | 115 | 9 | - | 5 |
| | | 99 | 6.5 | - | 4 |
| 11 | Unnamed Lake<br>71°58'N x 81°18'W<br>Gill Net #B20<br>27-28/8/80<br>24 hours<br>60 m (10-60 mm mesh) | 632 | 2700 | 8 | 21 |
| | | 785 | 3550 | 10 | 21 |
| | | 462 | 800 | 2 | 21 |
| | | - a further 30 Arctic charr were caught but poorly preserved. | | | |
| 12 | Unnamed Stream<br>72° 02'N x 81°29'W<br>Hoop Nets #BH5& 6<br>27-28/8/80<br>24 hours | - Arctic charr parr poorly preserved. | | | |

| Site | Sampling Location, Date, Time, and Gear | Length (mm) | Weight (g) | Sex | Age (yrs) |
|---|---|---|---|---|---|
| 13 | Unnamed Lake<br>71°55.5'N x 81°43'W<br>Gill Net B#21<br>27-28/8/80<br>24 hours<br>60 m (10-60 mm mesh) | No Fish | | | |
| 14 | Unnamed Lake<br>71°58'N x 82°07'W<br>Gill Net B#22<br>27-28/8/80<br>24 hours<br>60 m (10-60 mm mesh) | 610 | 2450 | 10 | 22 |
| | | 196 | 55 | 1 | 11 |
| | | - a further 18 Arctic charr were caught but poorly preserved. | | | |
| 15 | Stream<br>71°49'N x 79°19'W<br>Hoop Net BH#1&2<br>19-20/8/80<br>20 hours | No Fish | | | |
| 16 | Stream<br>71°14.5'N x 79°21'W<br>Hoop Net BH#3&4<br>21-23/8/80<br>41 hours | No Fish | | | |
| | NINESPINE STICKLEBACK | | | | |
| 12 | Unnamed Stream<br>72°02'N x 81°29'W<br>Hoop Net BH#5<br>27-28/8/80<br>24 hours | 53 | 0.65 | - | ** |

* Water chemistry and zooplankton samples taken at this site.

** Specimen available at Nat. Museum of Natural Science, Ottawa.

# APPENDIX III

# BONE STRONTIUM MEASUREMENTS

Table 23. Bone strontium (Sr) measurements and raw data for Arctic charr *(Salvelinus alpinus)* from lakes on Devon, Cornwallis, Somerset and Baffin Islands, NWT, with comments on the lakes and their charr populations.

| Sampling Location | Length (mm) | Weight (g) | Condition Factor | Sex | Age (y) | Bone Sr (µg/g) | Comments |
|---|---|---|---|---|---|---|---|
| **Devon Island (Fig. 2)** | | | | | | | |
| Location 16 | 392 | 470 | 0.780 | 2 | 22 | 57 | Coastal lake, good outlet to the ocean, both lake dwelling and searun populations, low water Sr (16.8 µg/L). |
| 75°33'N, 89°53'W | 411 | 580 | 0.835 | 2 | 23 | 55 | |
| | 380 | 480 | 0.875 | 8 | 24 | 69 | |
| | 380 | 440 | 0.802 | 2 | 17 | 46 | |
| | 385 | 480 | 0.841 | 8 | 19 | 46 | |
| | 705 | 3800 | 1.084 | 4 | 23 | 247 | |
| | 563 | 2020 | 1.132 | 2 | 19 | 291 | |
| | 550 | 1800 | 1.082 | 2 | 18 | 245 | |
| | 502 | 1210 | 0.956 | 8 | 17 | 221 | |
| Location 17 | 241 | 120 | 0.857 | 2 | 14 | 109 | High hilltop lakes on plateau, landlocked populations. |
| 75°10'N, 91°42'W | 297 | 200 | 0.763 | 8 | 18 | 113 | |
| Location 18 | 500 | 1000 | 0.800 | 8 | 32 | 112 | |
| 75°11'N, 91°54'W | 480 | 1050 | 0.949 | 9 | 37 | 109 | |
| | 490 | 950 | 0.807 | 4 | 38 | 147 | |
| | 470 | 920 | 0.880 | 2 | 30 | 114 | |
| **Cornwallis Island (Fig. 4)** | | | | | | | |
| Location 2 | 460 | 940 | 0.966 | 3 | 21 | 97 | Lowland lake, poor connection to the sea, lake-dwelling population. |
| 75°28'N, 95°44'W | 360 | 460 | 0.986 | 2 | 12 | 98 | |
| | 475 | 800 | 0.746 | 8 | 19 | 94 | |
| | 456 | 750 | 0.791 | 8 | 17 | 98 | |
| | 530 | 1450 | 0.974 | 4 | 21 | 88 | |
| Location 3 | 424 | 660 | 0.866 | 8 | 25 | 115 | Lowland lake, poor connection to the sea, lake-dwelling population. |
| 75°27.5'N, 95°42'W | 388 | 430 | 0.736 | 3 | 27 | 120 | |
| | 360 | 430 | 0.922 | 8 | 23 | 117 | |
| | 430 | 840 | 1.057 | 3 | 25 | 113 | |
| | 432 | 910 | 1.129 | 2 | 26 | 108 | |
| Location 4 | 476 | 710 | 0.658 | 2 | 17 | 131 | Lowland lake, poor connection to the sea, lake-dwelling population, high water Sr (72.8 µg/L). |
| 75°26'N, 95°38'W | 426 | 850 | 1.099 | 2 | 14 | 103 | |
| | 420 | 775 | 1.046 | 2 | 13 | 113 | |
| | 414 | 560 | 0.789 | 10 | 18 | 99 | |
| **Somerset Island (Fig. 7)** | | | | | | | |
| Location 1 | 555 | 1660 | 0.971 | 2 | 17 | 393 | Coastal lake, good connection with the sea, searun and possibly lake-dwelling populations, high water Sr (74 µg/L). |
| 73°56'N, 92°15'W | 525 | 1450 | 1.002 | 2 | 12 | 366 | |
| | 400 | 520 | 0.812 | 8 | 21 | 158 | |
| | 690 | 3450 | 1.050 | 9 | 26 | 452 | |
| | 572 | 1950 | 1.042 | 9 | 20 | 423 | |
| | 404 | 620 | 0.940 | 2 | 14 | 214 | |
| Location 3 | 451 | 810 | 0.883 | 2 | 13 | 95 | Plateau lake, possible migration route to sea, lake-dwelling and perhaps searun populations. |
| 73°57'N, 92°52'W | 580 | 1880 | 0.964 | 2 | 27 | 72 | |
| **Baffin Island (Fig. 10)** | | | | | | | |
| Location 1 | 511 | 1210 | 0.907 | 2 | 17 | 86 | Inland lake, cannibalistic lake-dwelling population. |
| 71°42.5'N, 79°27'W | 475 | 1060 | 0.989 | 2 | 12 | 109 | |
| Location 4 | 411 | 690 | 0.994 | 2 | 25 | 54 | Inland lake, lake-dwellings fish, heavily parasitized, low water Sr (6.0 µg/L). |
| 70°52'N, 79°36'W | 433 | 740 | 0.912 | 8 | 14 | 40 | |
| | 361 | 400 | 0.850 | 2 | 21 | 44 | |
| | 437 | 760 | 0.911 | 8 | 25 | 45 | |
| | 408 | 640 | 0.942 | 2 | 13 | 46 | |
| | 500 | 1080 | 0.864 | 8 | - | 41 | |
| | 362 | 460 | 0.970 | 3 | 17 | 44 | |

Table 23. (Continued)

| Sampling Location | Length (mm) | Weight (g) | Condition Factor | Sex | Age (y) | Bone Sr (µg/g) | Comments |
|---|---|---|---|---|---|---|---|
| Baffin Island (Fig. 10) | | | | | | | |
| Location 5 71°10.5'N, 79°21'W | 340 | 370 | 0.941 | 8 | 14 | 228 | Inland lake, lake-dwelling population, probably high water Sr levels. |
| | 385 | 490 | 0.857 | 2 | 21 | 209 | |
| | 400 | 560 | 0.875 | 4 | 19 | 198 | |
| Location 6 71°14'N, 79°09'W | 427 | 860 | 1.105 | 4 | 28 | 36 | Small isolated lake, lake-dwelling population. |
| Location 8 70°44.5'N, 80°38'W | 418 | 775 | 1.061 | 5 | 31 | 86 | Large inland lake, lake-dwelling population, low water Sr (3.8 µg/L). |
| | 385 | 475 | 0.832 | 10 | 22 | 86 | |
| | 404 | 570 | 0.864 | 2 | 24 | 92 | |
| | 428 | 710 | 0.906 | 2 | 21 | 80 | |
| | 431 | 760 | 0.949 | 5 | 23 | 91 | |
| Location 9 71°21'N, 84°37'W | 376 | 410 | 0.771 | 9 | 22 | 87 | Coastal lake, normally landlocked with searuns during high water years, searuns infrequent. |
| | 331 | 335 | 0.924 | 2 | 15 | 93 | |
| | 367 | 440 | 0.890 | 2 | 15 | 90 | |
| | 486 | 1000 | 0.871 | 5 | 28 | 344 | |
| | 525 | 1300 | 0.898 | 5 | 25 | 91 | |

# APPENDIX IV

## REPORTS RELATING TO THE LAND USE INFORMATION SERIES

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